Volume I, Pages 1-2076

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

14-1297

OPLUS TECHNOLOGIES, LTD.,
Plaintiff-Appellee,

v.

VIZIO, INC.,
Defendant-Appellant

SEARS HOLDINGS CORPORATION,
Defendant.

Appeal from the United States District Court for the Central District of California in Case No. 12-cv-5707, Senior District Judge Mariana R. Pfaelzer

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CORRECTED NONCONFIDENTIAL JOINT APPENDIX

Dated: November 13, 2014

OPLUS TECHNOLOGIES, LTD. v. VIZIO, INC., APPEAL NO. 14-1297 (FED. CIR.)

JOINT APPENDIX

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Appendix Page Range	**Dkt. No. (if applicable)**	**Date**	**Document**
A378			Subpoena Hearing
A379 - A394	N/A	06/25/2013	Transcript – Telephonic Conference
A395 - A489	N/A	09/09/2013	Transcript – Motion for Summary Judgment Hearing
A490 - A533	N/A	12/09/2013	Transcript – Motion for Attorneys' Fees Hearing
A538 - A543	14	12/20/2011	Corrected First Amended Complaint by Oplus Technologies, Ltd. against Sears Holdings Corporation, VIZIO, Inc.
A576 - A582	14-3	12/20/2011	Exhibit C to Corrected First Amended Complaint
A583 - A591	14-4	12/20/2011	Exhibit D to Corrected First Amended Complaint
A641 - A644	36	03/20/2012	Motion by Defendant VIZIO, Inc. to sever and transfer claims against VIZIO and stay claims against Sears
A876 - A888	44	06/15/2012	Memorandum Opinion and Order entered by the Honorable Robert M. Dow, Jr on 6/15/2012
A890 - A890	46	06/29/2012	Transferred claims against Defendant Vizio, Inc. to the USDC for the Central District of California.
A1144 - A1172	95	11/26/2012	Plaintiff Oplus Technologies, Ltd.'s Opening Claim Construction Brief
A1210 - A1230	98	12/17/2012	Plaintiffs' Response to VIZIO's Opening Claim Construction Brief
A1314 - A1320	101	01/07/2013	Notice of Motion and Motion for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. 101 and 112
A1454 - A1471	101-16	01/07/2013	Declaration of Dr. Sheila S. Hemami
A1513 - A1513	105	01/10/2013	Minutes of Markman Hearing held before Judge Mariana R. Pfaelzer
A1514 -	104	01/14/2013	Claim Construction Order

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A1536			
A1538 - A1568	108	02/04/2013	Opposition to Motion for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. 101 and 112
A1651 - A1671	108-10	02/04/2013	Declaration of Richard Ferraro
A1778 - A1829	113	03/04/2013	Order Denying Vizio, Inc.'s Motion for Summary Judgment
A1830 - A1901	114	03/20/2013	Joint Stipulation re: Oplus' Motion to Compel Production of Documents
A1902 - A1906	114-1	03/20/2013	(Attachments: # (1) Exhibit 1)
A1945 - A1956	114-7	03/20/2013	(Attachments: # (7) Exhibit C)
A2009 - A2076	117-3	04/01/2013	(Attachments: # (3) Exhibit B to Koole Declaration)

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A2107 - A2109	121	04/03/2013	Minute Order in Chambers Order Re ECF Nos.114, 115
A2110 - A2112	126	05/17/2013	Notice of Motion and Motion for Order for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents filed by Defendant VIZIO, Inc.
A2130 - A2251	126-4	05/17/2013	Declaration of Charles C. Koole
A2252 - A2259	126-5	05/17/2013	Exhibit A to Koole Decl.
A2260 - A2294	126-6	05/17/2013	Exhibit B to Koole Decl.
A2371 - A2389	127	05/24/2013	Opposition to Motion for Order for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents
A2735 - A2737	139	06/14/2013	Notice of Amended Infringement Contentions filed by Plaintiff Oplus Technologies, Ltd..
A2738 - A2764	139-1	06/14/2013	Exhibit A to Notice of Amended Infringement Contentions
A2765 - A2774	139-2	06/14/2013	Exhibit B to Notice of Amended Infringement Contentions
A2775 - A2787	139-3	06/14/2013	Exhibit C to Notice of Amended Infringement Contentions
A2788 -	139-4	06/14/2013	Exhibit D to Notice of Amended

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A2810			Infringement Contentions
A2815 - A2815	144	06/25/2013	Minutes of Telephonic Status Conference held before Judge Mariana R. Pfaelzer.
A2816 - A2818	148	07/29/2013	Notice of Motion and Motion for Summary Judgment as to Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 filed by Defendant VIZIO, Inc..
A2819 - A2849	153	07/29/2013	Memorandum of Points and Authorities in Support of Motion for Summary Judgment of Noninfringement
A2873 - A2877	148-3	07/29/2013	Declaration of Charles C. Koole in Support of Motion for Summary Judgment of Noninfringement
A2910 - A2986	148-6	07/29/2013	Exhibit 3 to Koole Declaration
A3003 - A3034	154	07/29/2013	Exhibit 5 to Koole Declaration
A3045 - A3051	148-11	07/29/2013	Exhibit 8 to Koole Declaration
A3060 - A3163	148-13	07/29/2013	Exhibit 10 to Koole Declaration
A3682 - A4254	148-26	07/29/2013	Exhibit B to Declaration of Sheila Hemami
A4259 - A4261	150	07/29/2013	Notice of Motion and Motion for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 filed by Defendant VIZIO, Inc.
A4262 - A4292	150-1	07/29/2013	Memorandum of Points and Authorities in support of VIZIO's Motion for Summary Judgment of Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840
A4462 - A4476	150-11	07/29/2013	Exhibit 8 to Declaration of Charles Koole

Appendix Page Range	Dkt. No. (if applicable)	Date	Document
A5315	211-4	11/25/2013	Exhibit AZ to Supplemental Declaration of Charles C. Koole
A5542 - A5594	156	08/16/2013	Joint Stipulation re: Oplus' Motion to Compel Discovery
A5595 - A5598	156-1	08/16/2013	Declaration of Gabriel I. Opatken
A5599 - A5602	156-2	08/16/2013	Exhibit A to Declaration of Gabriel I. Opatken
A5603 - A5605	156-3	08/16/2013	Exhibit B to Declaration of Gabriel I. Opatken
A5608 - A5613	156-5	08/16/2013	Exhibit D to Declaration of Gabriel I. Opatken
A5793 - A5795	157	08/16/2013	Notice of Motion re: Joint Stipulation re: Oplus' Motion to Compel Discovery
A5796 - A5820	159	08/19/2013	Oplus' Response to Vizio, Inc.'s Motion For Summary Judgment of Invalidity
A5853 - A5855	159-2	08/19/2013	Declaration of Daniel Ferri
A6221 - A6246	171	08/19/2013	Opposition to Motion for Summary Judgment as to Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840
A6290 - A6295	160-2	08/19/2013	Declaration of Daniel R. Ferri
A6373 - A6476	160-4	08/19/2013	Exhibit B to Declaration of Daniel R. Ferri
A6477 - A6483	160-5	08/19/2013	Exhibit C to Declaration of Daniel R. Ferri
A6484 - A6487	160-6	08/19/2013	Exhibit D to Declaration of Daniel R. Ferri
A6488 - A6525	160-7	08/19/2013	Exhibit E to Declaration of Daniel R. Ferri
A6567 - A6609	160-9	08/19/2013	Exhibit G to Declaration of Daniel R. Ferri
A6610 - A6703	160-10	08/19/2013	Exhibit H to Declaration of Daniel R. Ferri
A6749 -	160-11	08/19/2013	Exhibit J to Declaration of Daniel R.

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A6752			Ferri
A6895 - A7017	160-23	08/19/2013	Exhibit X to Declaration of Daniel R. Ferri
A7354 - A7367	168-5	08/26/2013	Exhibit 21 to Supplemental Declaration of Charles Koole
A7368 - A7384	180	08/26/2013	Exhibit 22 to Supplemental Declaration of Charles Koole
A7385 - A7402	180	08/26/2013	Exhibit 23 to Supplemental Declaration of Charles Koole

CONFIDENTIAL MATERIAL OMITTED

The material omitted in Appendix Page Range A3003-3034, A7368-7384, and A7385-7402 includes testimony from a VIZIO witness describing VIZIO's business strategy.

OPLUS TECHNOLOGIES, LTD. V. VIZIO, INC., APPEAL NO. 14-1297 (FED. CIR.)

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A7535 - A7538	190	10/31/2013	Notice of Motion and Motion for Attorney Fees and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power filed by Defendant VIZIO, Inc.
A7539 - A7594	195	10/31/2013	Memorandum of Points and Authorities in Support of Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power.
A7597 - A8049	196	10/31/2013	Declaration of Charles C. Koole in Support of Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power, and Exhibits Thereto
A8052 - A8084	206	11/18/2013	Plaintiff's Opposition to Vizio's Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power
A8085 - A8096	203	11/18/2013	Declaration of Daniel R. Ferri in opposition to Motion for Attorney Fees and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power
A8136 - A8435	203-3	11/18/2013	Exhibit C Part 1 to the Declaration of Daniel R. Ferri

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A9437 - A9443	203-10	11/18/2013	Exhibit D to the Declaration of Daniel R. Ferri
A9444 - A9455	203-11	11/18/2013	Exhibit E to the Declaration of Daniel R. Ferri
A9468 - A9478	203-14	11/18/2013	Exhibit H to the Declaration of Daniel R. Ferri
A9479 - A9497	203-15	11/18/2013	Exhibit I to the Declaration of Daniel R. Ferri
A9504 - A9565	203-17	11/18/2013	Exhibit K to the Declaration of Daniel R. Ferri
A9566 - A9575	207	11/18/2013	Exhibit L to the Declaration of Daniel R. Ferri
A9576 - A9592	203-19	11/18/2013	Exhibit M to the Declaration of Daniel R. Ferri
A9593 - A9595	203-20	11/18/2013	Exhibit N to the Declaration of Daniel R. Ferri
A9596 - A9599	203-21	11/18/2013	Exhibit O to the Declaration of Daniel R. Ferri
A9600 - A9601	203-22	11/18/2013	Exhibit P to the Declaration of Daniel R. Ferri
A9602 - A9607	203-23	11/18/2013	Exhibit Q to the Declaration of Daniel R. Ferri
A9608 - A9609	203-24	11/18/2013	Exhibit R to the Declaration of Daniel R. Ferri
A9610 - A9614	203-25	11/18/2013	Exhibit S to the Declaration of Daniel R. Ferri
A9615 - A9617	203-26	11/18/2013	Exhibit T to the Declaration of Daniel R. Ferri
A9618 - A9621	203-27	11/18/2013	Exhibit U to the Declaration of Daniel R. Ferri
A9622 - A9630	203-28	11/18/2013	Exhibit V to the Declaration of Daniel R. Ferri
A9631 - A9640	203-29	11/18/2013	Exhibit W to the Declaration of Daniel R. Ferri
A9656 - A9679	203-31	11/18/2013	Exhibit Y to the Declaration of Daniel R. Ferri

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A9686 - A9759	203-33	11/18/2013	Exhibit AA to the Declaration of Daniel R. Ferri
A9760 - A9762	203-34	11/18/2013	Exhibit AB to the Declaration of Daniel R. Ferri
A9929 - A9934	203-39	11/18/2013	Exhibit AG to the Declaration of Daniel R. Ferri
A9935 - A9998	203-40	11/18/2013	Exhibit AH to the Declaration of Daniel R. Ferri
A10029 - A10030	203-45	11/18/2013	Exhibit AM to the Declaration of Daniel R. Ferri
A10031 - A10032	203-46	11/18/2013	Exhibit AN to the Declaration of Daniel R. Ferri
A10033 - A10044	203-47	11/18/2013	Exhibit AO to the Declaration of Daniel R. Ferri
A10059 - A10101	203-49	11/18/2013	Exhibit AQ to the Declaration of Daniel R. Ferri
A10492 - A10495	211-2	11/25/2013	Supplemental Declaration of Charles C. Koole
A10515 - A10516	211-5	11/25/2013	Exhibit BA Supplemental Declaration of Charles C. Koole
A10517 - A10518	211-6	11/25/2013	Exhibit BB to Supplemental Declaration of Charles C. Koole
A10601 - A10604	218	12/16/2013	Declaration of Raymond P. Niro
A10738 - A10738	2 (MDL)	07/24/2012	Motion to Transfer (Amended) Filed by: Oplus Technologies
A10943	17-23 (MDL)	08/14/2012	Exhibit F to Declaration of James J. Lukas
A11062 - A11064	26 (MDL)	10/03/2012	Order Denying Transfer
A11065 - A11067	93 (1:11-cv-08539)	09/03/2014	Order
A11068 - A11075	84 (1:11-cv-08539)	07/28/2014	Report and Recommendation
A11076 - A11089	N/A	12/09/2013	PowerPoint Presentation Used by Plaintiff at Hearing on December 9, 2013

Appendix Page Range	**Dkt. No. (if applicable)**	**Date**	**Document**
A11090 - A11107	N/A	02/28/2013	Non-party MediaTek USA Inc.'s Objections and Responses to the "Subpoena to Produce Documents, Information, or Objects to Permit Inspection of Premises in a Civil Action" Dated February 14, 2013 and Issued by Oplus Technologies, Ltd.
A11108 - A11141	N/A	02/28/2013	Non-party Qualcomm Incorporated's Responses and Objections to Oplus Technologies, Ltd.'s Subpoena to Produce Documents, Etc. and Subpoena to Testify at Deposition in a Civil Action
A11142 - A11153	N/A	03/01/2013	Non-party Witness STMicroelectronics, Inc.'s Responses and Objections to Plaintiff's Subpoenas for Production of Documents and Testimony
A11154 - A11164	364 (6:11-cv-00421)	08/06/2014	Order and Opinion Denying Attorney's Fees
A11165 - A11183	62 (1:11-cv-08539)	05/16/2014	Amended Memorandum of Points and Authorities in Support of Defendant VIZIO, Inc.'s Motion for Attorneys' Fees and Expenses Pursuant to 35 U.S.C. § 285, 28 U.S.C. § 1927, and the Court's Inherent Power
A11184 - A11299	62-1 (1:11-cv-08539)	05/16/2014	Amended Declaration of Adrian M. Pruetz in Support of Defendant VIZIO, Inc.'s Motion for Attorneys' Fees and Expenses Pursuant to 35 U.S.C. § 285, 28 U.S.C. § 1927, and the Court's Inherent Power
A11300 - A11301	98 (1:11-cv-07539)	09/10/2014	Order Denying Oplus Technologies, Ltd.'s Motion for Attorneys' Fees and Expenses
A11302 - A11305	84 (1:10-cv-04298)	12/07/2012	Order Granting Defendant's Motion for Attorneys' Fees and Expenses in *Illinois Comp. Res. v. Best Buy Stores, L.P.*,

Appendix Page Range	Dkt. No. (if applicable)	Date	Document
			Case No. 1:10-cv-04298, Dkt. 84 (N.D. Ill. Dec. 7, 2012)
A11306 - A11327	340 (9:09-cv-81046)	08/31/2012	Order Granting Motion for Fees and Costs, Requesting Submission of Materials for In Camera Review and Granting Motion to Strike in *Innovative Biometric Tech., LLC v. Toshiba Am. Info. Sys., Inc.*, Case No. 9:09-cv-81046 (S.D. Fla. Aug. 31, 2012)

CONFIDENTIAL MATERIAL OMITTED

The material omitted in Appendix Page Range A9566-9575 includes testimony from a VIZIO witness describing VIZIO's business strategy.

The material omitted in Appendix Page Range A7539-7594 describes confidential details of Oplus Technologies, Ltd.'s business, including the purchase price of the patent portfolio including the patents that were at issue in this case.

The material omitted in Appendix Page Range A7597-8049 includes VIZIO counsel's confidential invoices to VIZIO for the fees it incurred in this action.

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UNITED STATES DISTRICT COURT
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WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION; VIZIO, INC., Defendants.	CASE NO.: CV12-5707 MRP (Ex) Hon. Judge Mariana R. Pfaelzer **STIPULATED PROTECTIVE ORDER**

1. **GOOD CAUSE; LIMITATIONS**

1.1 Disclosure and discovery activity in this action are likely to involve production of trade secrets or other confidential research, development, commercial, proprietary, or private information for which special protection from public disclosure and from use for any purpose other than this litigation is warranted. Accordingly, the parties hereby stipulate to and request that the Court enter the following Stipulated Protective Order pursuant to Rule 26(c) of the Federal Rules of Civil Procedure.

1.2 The parties believe that good cause exists for the entry of this Order because Protected Material (as defined below) constitutes trade-secret or other confidential or proprietary information, the disclosure of which is likely to have the effect of harming the competitive position of the Designating Party (as defined below) or violating an obligation of confidentiality owed to a third party.

1.3 Protected Material designated under the terms of this Order shall be used by a Receiving Party (as defined below) solely for this litigation and shall not be used directly or indirectly for any other purpose whatsoever, and its disclosure is prohibited except as expressly provided in this Order.

1.4 The parties acknowledge that this Order does not confer blanket protections on all disclosures or responses to discovery. Designations of confidentiality shall be made with care and shall not be made absent a good faith belief that the Protected Material satisfies the criteria set forth below for each category.

2. **DEFINITIONS**

2.1 Party: any party to this action, including all of its officers, directors, and employees.

2.2 Disclosure or Discovery Material: all items or information, including items or information from a non-party, regardless of the medium or manner in which generated, stored, or maintained (including, among other things, testimony,

transcripts, or tangible things) that are produced or generated in disclosures or responses to discovery in this matter.

2.3 "Confidential" Information or Items: information (regardless of how generated, stored, or maintained) or tangible things concerning a person's business operations, processes, financial, and technical and development information, which a party would not disclose without confidentiality protection in the ordinary course of that party's business that a Producing Party believes in good faith can be disclosed to select employees of a Receiving Party (as described in paragraph 7.5 below) solely for purposes of this litigation, but which must be protected from widespread dissemination or disclosure to non-parties as set forth herein.

2.4 "Highly Confidential — Attorneys' Eyes Only" Information or Items: extremely sensitive "Confidential" Information (as defined above) that a Producing Party believes in good faith (a) creates a substantial risk of harm to the Producing Party if disclosed to a Receiving Party; (b) is required to be kept confidential to protect the privacy interests of an individual; or (c) is subject to an express obligation of confidentiality owed by the Producing Party to a third party.

2.5 Receiving Party: a Party that receives Disclosure or Discovery Material from a Producing Party.

2.6 Producing Party: a Party or non-party that produces Disclosure or Discovery Material in this action.

2.7 Designating Party: a Party or non-party that designates information or items that it produces in disclosures or in responses to discovery or subpoena as "Confidential" or "Highly Confidential — Attorneys' Eyes Only."

2.8 Protected Material: any Disclosure or Discovery Material that is designated as "Confidential" or "Highly Confidential — Attorneys' Eyes Only."

2.9 Outside Counsel: attorneys of the law firms of Niro Haller & Niro, Kneafsey & Friend LLP, Glaser Weil Fink Jacobs Howard Avchen & Shapiro LLP,

and Lee Tran & Liang LLP who are not employees of a Party but who are retained to represent or advise a Party in this action.

2.10 In-House Counsel: attorneys who are employees of a Party.

2.11 Counsel (without qualifier): Outside Counsel and In-House Counsel.

2.12 Expert: a person who has been retained by a Party or its counsel to serve as an expert witness or as a consultant in this action and who has been approved to receive Protected Material in accordance with paragraph 7.7 below.

2.13 Professional Vendors: persons or entities that provide litigation support services (e.g., photocopying; videotaping; translating; preparing exhibits or demonstrations; organizing, storing, or retrieving data in any form or medium) and their employees and subcontractors. This definition includes a professional jury or trial consultant retained in connection with this litigation.

2.14 Patents-in-Suit: U.S. Patents Nos. 6,239,842 and 7,271,840, which are asserted in the present lawsuit.

3. **SCOPE**

The protections conferred by this Order cover not only Protected Material, but also any information copied or extracted therefrom, as well as all copies, excerpts, summaries, or compilations thereof, plus testimony, conversations, or presentations by parties or counsel to or in court or in other settings that might reasonably be expected to reveal Protected Material. Nothing in this paragraph shall be construed to prejudice either Party's right to use any Protected Material in court or in any court filing with the consent of the Producing Party or by order of the Court.

4. **DURATION**

Even after the final disposition of this litigation, the confidentiality obligations imposed by this Order shall remain in effect until a Designating Party agrees otherwise in writing or a court order otherwise directs. Final disposition shall be deemed to be the later of (1) dismissal of all claims and defenses in this action, with or without prejudice; and (2) final judgment herein after the completion and

exhaustion of all appeals, rehearings, remands, trials, or reviews of this action, including the time limits for filing any motions or applications for extension of time pursuant to applicable law.

5. **DESIGNATING PROTECTED MATERIAL**

5.1 Manner and Timing of Designations. Except as otherwise provided in this Order, or as otherwise stipulated or ordered, material that qualifies for protection under this Order must be clearly so designated before the material is disclosed or produced.

Designation in conformity with this Order requires:

(a) for information in documentary form (other than transcripts of depositions or other pretrial or trial proceedings), that the Producing Party affix the legend "CONFIDENTIAL" or "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" on each page that contains protected material. If only a portion or portions of the material on a page qualifies for protection, the Producing Party also must clearly identify the protected portion(s) (e.g., by making appropriate markings in the margins) and must specify, for each portion, the level of protection being asserted.

A Party or non-party that makes original documents or materials available for inspection need not designate them for protection until after the inspecting Party has indicated which material it would like copied and produced. During the inspection and before the designation, all of the material made available for inspection shall be deemed "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY." After the inspecting Party has identified the documents it wants copied and produced, the Producing Party must determine which documents, or portions thereof, qualify for protection under this Order, then, before producing the specified documents, the Producing Party must affix the appropriate legend ("CONFIDENTIAL" or "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY") on each page that contains Protected Material. If only a portion or portions of the material on a page qualifies for protection, the Producing Party also must clearly identify the protected

portion(s) (e.g., by making appropriate markings in the margins) and must specify, for each portion, the level of protection being asserted.

(b) for testimony given in deposition or in other pretrial or trial proceedings, that the Party or non-party offering or sponsoring the testimony identify on the record, before the close of the deposition, hearing, or other proceeding, that the transcript or portions thereof be designated "CONFIDENTIAL" or "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY," or advise the opposing Party and the stenographer and videographer in writing, within ten (10) business days after receipt of the deposition transcript, that the information is "CONFIDENTIAL" or "HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY." All deposition testimony shall be treated as "HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY" until ten (10) business days after receipt of the deposition transcript.

(c) for information produced in some form other than documentary, and for any other tangible items, that the Producing Party affix in a prominent place on the exterior of the container or containers in which the information or item is stored the legend "CONFIDENTIAL" or "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY." If any items produced in a non-paper medium are printed by the Receiving Party, the Receiving Party must immediately mark each page of the printed version with the confidentiality designation of the media.

5.3 Inadvertent Failures to Designate. An inadvertent failure to designate qualified information, testimony or items as "CONFIDENTIAL" or "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" does not waive the Designating Party's right to secure protection under this Order for such material. Upon discovering the inadvertent failure, the Designating Party must promptly notify the Receiving Party in writing of the inadvertent failure to designate and take steps necessary to replace the documents with appropriate legends or otherwise designate the materials as set forth above. Upon receipt of this written notice, the Receiving Party must promptly make all reasonable efforts to assure that the material is treated

in accordance with the provisions of this Order, including retrieving any copies that may have been distributed to unauthorized individuals and destroying any copies of documents that have been replaced with the proper designation.

5.4 Materials That are Mistakenly Designated: If it comes to a Designating Party's attention that information or items that it designated for protection do not qualify for protection at all or do not qualify for the level of protection initially asserted, that Designating Party must promptly notify all other parties that it is withdrawing the mistaken designation.

6. **CHALLENGING CONFIDENTIALITY DESIGNATIONS**

6.1 At any time in these proceedings following the production or designation of material as "CONFIDENTIAL" or "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY," counsel for a Party may challenge such designation in accordance with the procedures set forth in Rule 37 of the Federal Rules of Civil Procedure and Local Rules 37-1 through 37-4.

The burden of persuasion in any such challenge shall at all times be on the Producing Party. Until the Court rules on the challenge, all parties shall continue to afford the material that is the subject of the challenge the level of protection to which it is entitled under the Designating Party's designation.

7. **ACCESS TO AND USE OF PROTECTED MATERIAL**

7.1 Basic Principles. All Protected Material shall be used solely for this litigation and the preparation and trial in this case, or any related appellate proceeding, and not for any other purpose whatsoever, including without limitation any other litigation, patent prosecution or acquisition, or any business or competitive purpose or function. Protected Material shall not be distributed, disclosed, or made available to anyone except as expressly provided in this Order.

7.2 Secure Storage: Protected Material must be stored and maintained by a Receiving Party at a location and in a secure manner that ensures that access is limited to the persons authorized under this Order.

7.3. Legal Advice Based on Protected Material: Nothing in this Order shall be construed to prevent Counsel from advising their client with respect to this litigation based in whole or in part upon Protected Materials, provided Counsel does not disclose the Protected Material itself except as provided in this Order.

7.4 Limitations: Nothing in this Order shall restrict a Producing Party's use or disclosure of its own Confidential or Highly Confidential Information, nor the use or disclosure of information by a Receiving Party: (a) that is or has become publicly known through no fault of the Receiving Party; (b) that is lawfully acquired by or known to the Receiving Party independent of the Producing Party; (c) with the consent of the Producing Party; or (d) pursuant to Order of the Court.

7.5 Disclosure of "CONFIDENTIAL" Information or Items. Unless otherwise ordered by the court or permitted in writing by the Designating Party, a Receiving Party may disclose any information or item designated "CONFIDENTIAL" only to:

(a) Persons entitled to access to "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" Information or Items pursuant to paragraph 7.6 (a) through (g) below; and

(b) for Plaintiff and Defendant, one additional officer or employee (who may be In-House Counsel) to whom disclosure is reasonably necessary for this litigation, and who has signed the "Agreement to Be Bound by Protective Order" (Exhibit A).

7.6 Disclosure of "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" Information or Items. Unless otherwise ordered by the court or permitted in writing by the Designating Party, a Receiving Party may disclose any information or item designated "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" only to:

(a) the Receiving Party's Outside Counsel in this action, including Outside Counsel's support staff such as paralegals, technology specialists, and secretaries;

(b) two In-House Counsel of the Receiving Party to whom disclosure is reasonably necessary for this litigation, including their paralegals and secretaries, who have signed the "Agreement to Be Bound by Protective Order" (Exhibit A).

In the event In-House Counsel initially designated under this Order is no longer employed by a Receiving Party or is otherwise unavailable, a Receiving Party may, with notice to all Parties, identify another In-House Counsel to receive "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" information under this paragraph, provided that such In-House Counsel complies with the requirements of this paragraph.

Within ten (10) business days of receipt of notice identifying either initially or subsequently designated In-House Counsel, the party receiving such notice may object in writing to the identified In-House Counsel for good cause. Any such objection must be made in accordance with the procedures set forth in Rule 37 of the Federal Rules of Civil Procedure and Local Rules 37-1 through 37-4, and the objecting party shall at all times have the burden of showing that good cause exists to prevent the disclosure of Protected Material to the identified In-House Counsel. If relief is sought, Protected Material shall not be disclosed to the In-House Counsel in question until the objection is resolved by the Court. In the absence of an objection at the end of the ten day period, the person shall be deemed approved under this Order.

(c) experts or consultants of the Receiving Party to whom disclosure is reasonably necessary for this litigation who have been approved in accordance with paragraph 7.7 below, and their administrative support staff if any;

(d) the Court and its personnel;

(e) court reporters, their staffs, and Professional Vendors such as graphics services or jury consultants to whom disclosure is reasonably necessary for this litigation and who have signed the "Agreement to Be Bound by Protective Order" (Exhibit A). Jury research participants hired by jury consultants may be told or shown Protected Materials or information provided: (1) they are not be affiliated with

any Party or its direct competitor, (2) are not themselves given custody of any copies, summaries, or excerpts of Protected Material or permitted to remove any notes taken during the exercise from the research facility; and (3) agree in writing to be bound by confidentiality;

(f) only during their depositions or testimony at trial, (1) a current or former officer, director, or employee of the Producing Party or original source of the information, (2) any person selected by a Producing Party to provide testimony pursuant to Rule 30(b)(6) of the Federal Rules of Civil Procedure, and (3) as to documents produced by a named inventor or previous owner of any of the Patents-in-Suit only, a current or former officer, director, employee, or 30(b)(6) designee of Plaintiff. Persons authorized to view Protected Material under this sub-paragraph (f) shall not retain or be given copies of any Protected Materials.

(g) a person who appears on the face of the document to be the author, addressee, or recipient of the document or the original source of the information. Persons authorized to view Protected Material under this sub-paragraph (g) shall not retain or be given copies of any Protected Materials.

(h) Outside Counsel for any Receiving Party may request that any Protected Material designated "HIGHLY CONFIDENTIAL — ATTORNEYS' EYES ONLY" be shown to individuals not otherwise approved to receive such information under this Protective Order by specifying the Bates range of the documents and identifying the basis of the need for such disclosure. The Receiving Party and Designating Party shall enter into good faith discussions directed to approving such disclosure and/or agreeing to an appropriately redacted version which may be disclosed while still satisfying the need specified by the Receiving Party. If the Parties are unable to reach agreement, the Receiving Party may move the Court for approval to make the disclosure.

7.7 **Experts and Consultants**

(a) Prior to disclosing any Protected Material to any outside experts or consultants, the party seeking to disclose such information shall provide the Producing Party or Parties with written notice that includes: (i) the name of the person; (ii) the present employer and title of the person; (iii) an up-to-date curriculum vitae of the person; (iv) a listing of all cases in which the person has served as a testifying expert over the past ten (10) years, including an identification of the party for which he or she provided expert services; (v) a listing of all consulting projects undertaken by the expert or consultant within the last five (5) years on the subjects of televisions or television components; and (vi) an executed copy of the "Agreement to Be Bound by Protective Order" (Exhibit A). Notwithstanding the foregoing, if any of the information required under subpart (v) of this provision is subject to a confidentiality obligation between the outside expert or consultant on the one hand and a third-party on the other hand, then the a outside expert or consultant shall disclose that a confidential relationship exists and provide whatever information can be disclosed without violating any confidentiality agreements. The Parties agree to meet and confer in good faith to resolve any disputes before seeking relief from the Court.

(b) Within ten (10) business days of receipt of this information, the party receiving such notice may object in writing to the proposed outside expert or consultant for good cause. Any such objection must be made in accordance with the procedures set forth in Rule 37 of the Federal Rules of Civil Procedure and Local Rules 37-1 through 37-4, and the objecting party shall at all times have the burden of showing that good cause exists to prevent the disclosure of Protected Material to the identified expert or consultant. If relief is sought, Protected Material shall not be disclosed to the expert or consultant in question until the objection is resolved by the Court. In the absence of an objection at the end of the ten day period, the person shall be deemed approved under this Order.

(c) For purposes of this section, "good cause" shall be an objectively reasonable concern that the third party will, advertently or inadvertently, use or disclose Protected Material outside of this litigation. Experts or consultants authorized to receive Protected Material under this section shall not be a current officer, director, or employee of a Party or of a Party's competitor, nor anticipated at the time of retention to become an officer, director, or employee of a Party or of a Party's competitor.

8. **PROTECTED MATERIAL SUBPOENAED OR ORDERED PRODUCED IN OTHER LITIGATION**

If any party or person that has obtained any Protected Material under the terms of this Order receives a subpoena or other legal process commanding the production of any such documents or information, such person shall promptly notify the Designating Party of the service of the subpoena. The person receiving the subpoena shall not produce any confidential information in response to the subpoena without either the prior written consent of the Designating Party or an order of a court of competent jurisdiction. However, the Designating Party shall have the burden of seeking a court order relieving the subpoenaed party of the obligations of the subpoena.

9. **UNAUTHORIZED DISCLOSURE OF PROTECTED MATERIAL**

If a Receiving Party learns that, by inadvertence or otherwise, it has disclosed Protected Material to any person or in any circumstance not authorized under this Order, the Receiving Party must immediately (a) notify in writing the Designating Party of the unauthorized disclosures, (b) use its best efforts to retrieve all copies of the Protected Material, (c) inform the person or persons to whom unauthorized disclosures were made of all the terms of this Order, and (d) request that such person or persons execute the "Acknowledgment and Agreement to Be Bound" that is attached hereto as Exhibit A.

Unauthorized or inadvertent disclosure does not change the status of Protected Material or waive the right to hold the disclosed document or information as Protected.

10. **<u>INADVERTENT DISCLOSURE OF PRIVILEGED MATERIAL</u>**

If a Producing Party inadvertently produces a document that it later discovers or in good faith asserts to be a privileged document or a document protected from disclosure by the work-product doctrine, the production of that document shall not be deemed to constitute a waiver of, nor prejudice to, any privilege or immunity with respect to such information or document(s) or of any work product doctrine or other immunity that may attach thereto, including without limitation the attorney-client privilege, the joint defense privilege, and the work product doctrine, provided, if discovered by the Producing Party, the Producing Party must notify the Receiving Party in writing promptly after discovery of such inadvertent production. All copies of such document(s) shall be returned to the Producing Party or destroyed within 5 days after such notice.

In the event documents are returned to the Producing Party pursuant to the above paragraph, the Producing Party shall maintain the referenced documents until the parties resolve any dispute concerning the privileged nature of such documents or the Court rules on any motion to compel such documents. If a dispute arises concerning the privileged nature of the document(s) destroyed or returned, the parties shall meet and confer in good faith in an effort to resolve the dispute. If the parties are unable to resolve the dispute, the Receiving Party may file a motion to compel the production of such document(s) in accordance with the procedures set forth in Rule 37 of the Federal Rules of Civil Procedure and Local Rules 37-1 through 37-4. In the event of such a motion to compel, the Producing Party shall have the burden to demonstrate the claimed privilege, work product immunity or other immunity. However, in no case will the return or destruction of any demanded document be delayed or refused by reason of a party's objection to the demand or by the filing of a

motion to compel, nor may a party assert the fact of the inadvertent production as a ground for any such motion. The parties further agree that the Receiving Party will not use or refer to any information contained within the document(s) at issue, including in deposition, at hearing or at trial or in any Court filing, unless and until such a motion to compel that document is granted by the Court, except as such information may appear in any applicable privilege log.

In addition, the Receiving Party has an affirmative obligation to notify the Producing Party if and when the Receiving Party discovers a document produced by the Producing Party that the Receiving Party reasonably believes may contain information subject to the attorney-client privilege, the joint defense privilege, and/or the work product privilege.

11. **FILING PROTECTED MATERIAL**. Without written permission from the Designating Party or a court Order secured after appropriate notice to all interested persons, a Party may not file in the public record in this action any Protected Material. A Party that seeks to file under seal any Protected Material must comply with Civil Local Rule 79-5.

12. **FINAL DISPOSITION**. Unless otherwise ordered or agreed in writing by the Producing Party, within sixty days after the final termination of this action, each Receiving Party must, at the option of the Producing Party, destroy or return to the Producing Party all Protected Material. As used in this section 12, "all Protected Material" includes all copies, abstracts, compilations, summaries, or any other form of reproducing or capturing any of the Protected Material. The Receiving Party must submit a written certification to the Producing Party (and, if different, the Designating Party) by the sixty day deadline confirming that all Protected Material was destroyed or handled as otherwise agreed and that the Receiving Party has not retained any copies, abstracts, compilations, summaries, or other forms of reproducing or capturing any of the Protected Material. Notwithstanding this provision, Outside Counsel are entitled to retain an archival copy of all pleadings, motion papers, transcripts, legal

memoranda, correspondence, or attorney work product, even if such materials contain Protected Material. Any such archival copies that contain or constitute Protected Material remain subject to this Order as set forth in section 4 above.

13. **MISCELLANEOUS**

13.1 Right to Further Relief. Nothing in this Order abridges the right of any person to seek its modification by the Court in the future. By stipulating to this Order, the Parties do not waive the right to argue that certain material may require confidentiality protections in addition to or different from those set forth herein.

13.2 Right to Assert Other Objections. By stipulating to the entry of this Order, no Party waives any right it otherwise would have to object to disclosing or producing any information or item. Similarly, no Party waives any right to object on any ground to use in evidence of any of the material covered by this Order.

IT IS SO STIPULATED, THROUGH COUNSEL OF RECORD.

DATED: April 3, 2013

NIRO HALLER & NIRO

By: *<u>/s/ Gabriel I. Opatken</u>*

Attorneys for Plaintiff
OPLUS TECHNOLOGIES, LTD.

DATED: April 3, 2013

GLASER WEIL FINK JACOBS HOWARD AVCHEN & SHAPIRO LLP

By: <u>/s/ Charles C. Koole</u>

Attorneys for Defendant
VIZIO, INC.

PURSUANT TO STIPULATION, IT IS SO ORDERED.

Mariana R. Pfaelzer

Dated: April 5, 2013

The Honorable Mariana R. Pfaelzer
United States District Judge

EXHIBIT A

IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (E) *Assigned to the Honorable Mariana R. Pfaelzer*

UNDERTAKING OF ____________________

I, [*insert person's name*], agree to be bound by the Stipulated Protective Order and state the following:

I have been retained by [*insert party's name*] as an expert or consultant in connection with this case. I will be receiving confidential information and Protected Materials that are covered by the Court's protective order dated [*fill in date*]. I have read the Court's Protective Order and understand that the confidential information and Protected Materials are provided pursuant to the terms and conditions in that order.

I agree to be bound by the Court's Protective Order. I agree to use the confidential information and Protected Materials solely for purposes of this case. I understand that neither the Protected Materials nor any notes concerning that information may be disclosed to anyone that is not bound by the Court's Protective Order. I agree to return the Protected Materials and any notes concerning that information to the attorney for [*insert name of retaining party*] or to destroy the information and any notes at that attorney's request.

I submit to the jurisdiction of the Court that issued the Protective Order for purposes of enforcing that Order. I give up any objections I might have to that

Court's jurisdiction over me or to the propriety of venue in that Court for purposes of the enforcement of the Protective Order.

____

(signature)

Link: 190

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD.,
Plaintiff,
v.
SEARS HOLDINGS CORPORATION; VIZIO, INC.;
Defendant(s).

Case No. 2:12-cv-05707-MRP-Ex

ORDER DENYING DEFENDANT VIZIO, INC.'S MOTION FOR ATTORNEYS' FEES AND EXPERT WITNESS FEES

I. INTRODUCTION

Plaintiff Oplus Technologies, Ltd. ("Oplus") has sued Defendant Vizio, Inc. ("Vizio") for infringement of two video signal processing patents: U.S. Patent No. 6,239,842 ("the '842 Patent") and U.S. Patent No. 7,271,840 ("the '840 Patent"). On a full record after the close of discovery, the Court granted Vizio's motion for summary judgment of both noninfringement of the asserted claims of the '842 and '840 Patents and anticipation as to the asserted claims of the '842 Patent. The Clerk entered judgment in favor of Vizio. Vizio now moves for attorney fees and expert witness fees pursuant to 35 U.S.C. § 285, 28 U.S.C. § 1927, and the Court's inherent power.

II. BACKGROUND AND PROCEDURAL HISTORY

The Court finds the following facts to be supported by clear and convincing evidence.

The history of this case does not begin with the filing of the complaint. Instead, it begins with a prior lawsuit, *IP Innovation LLC v. Vizio*. Civ. No. 1:08-cv-393 (N.D. Ill. July 1, 2010) ("IP Innovation Case"). In the IP Innovation Case, the law firm Niro, Haller & Niro represented IP Innovation LLC and Technology Licensing Corporation ("TLC") in a patent infringement action against several defendants, including Vizio, Inc. Six lawyers from Niro, Haller & Niro appeared on behalf of IP Innovation, including Raymond Niro, Arthur Gasey, and Paul Gibbons. The patents at issue claimed apparatuses and methods for processing video signals to enhance television resolution.

On December 1, 2011, Oplus, represented by Niro, Haller & Niro, filed its original complaint in this lawsuit against Vizio and Sears Holding Corporation ("Sears") in the Northern District of Illinois alleging infringement of the '842 and '840 Patents. Doc. No. 1. Like the patents at issue in the IP Innovation Case, the '842 and '840 Patents relate to video signal processing, as described in the Court's order on noninfringement and invalidity. *See* Doc. No. 183. The asserted claims of the '842 and '840 Patents are directed to methods for receiving pixel data from a video input signal, applying an algorithm to the pixel data, and using the results of the algorithm to determine values for the pixel data in the output signal. The algorithm of the '842 Patent converts an interlaced video signal into a deinterlaced signal for display on progressive scan displays. The algorithm of the '840 Patent corrects error in a real time streaming digital video image by analyzing pixel entropy.

Mr. Niro, Mr. Gasey, Mr. Gibbons, and Gabriel Opatken appeared on the record on behalf of Oplus, but Mr. Opatken was most often before the Court. The original complaint alleged that Vizio infringed the methods of the '842 and '840

Patents by using and contributing to others' use of the allegedly infringing television sets. *Id*. at ¶ 9–11. The original complaint further alleged that Sears, as a reseller of Vizio television sets and "other products," also infringed by use of the same. *Id*. at 10. Oplus provided one example of an allegedly infringing product sold by Sears that was not manufactured by Vizio. *Id*. On December 20, 2011, Oplus filed a corrected amended complaint. Doc. No. 14. The First Amended Complaint omitted allegations that Sears had used the allegedly infringing products and added allegations of indirect infringement against Vizio. *Id*. at 9–12.

A. Transfer Motion to the Central District of California

Sears asked Oplus for its consent to an extension of time both to answer the complaint and to hold the initial status conference, and Oplus agreed to the extensions. Doc. No. 27. When Sears moved the Court only for an extension of time to answer the complaint, Oplus took issue with Sears's decision not to postpone the status conference. *See* Doc. Nos. 23, 27. Oplus moved the Court for an extension of time to hold the initial status conference, unilaterally filing the joint status report of both parties without the signatures of the other parties and scheduling the hearing on its motion after the date of the initial status conference. Doc. No. 27. Vizio did not oppose the motion, and the Court granted the extension of time. Doc. Nos. 29–30.

Following the initial status conference, Vizio moved to sever the cases against Vizio and Sears and transfer the case against Vizio to the Central District of California. Doc. No. 37. Oplus had filed several suits in the Northern District of Illinois, all against a single distributor of video-related products, and had named Sears as a defendant in each lawsuit, presumably in order to keep the suits in the same location. Vizio listed several companies headquartered in California that sold allegedly infringing chipsets to Vizio. Oplus, rather than rebut Vizio's arguments, argued that, based on information from the IP Innovation Case, Vizio had "no knowledge or involvement in design and manufacturing" and that all the

infringing circuitry was provided by suppliers in China and Taiwan. Doc. No. 41 at 3, 5. The Court granted Vizio's motion, noting that "[w]hen a plaintiff chooses only one reseller of the accused product out of many, the 'inference [] is irresistible that the principal reason [the customer defendant] has been sued is to establish venue in the Northern District of Illinois.'" Doc. No. 44 (quoting *Ambrose v. Steelcase, Inc.*, Case No. 02-c-2753, 2002 WL 1447871, at *7 (N.D. Ill. July 3, 2002).

Following the order granting the motion to transfer, Oplus petitioned the United States Judicial Panel on Multidistrict Litigation for centralization of the transferred case with the cases against Sears that remained in the Northern District of Illinois. The panel denied the transfer. *In re Oplus Techs., Ltd., Patent Litig.*, 899 F. Supp. 2d 1373 (M.D.L. 2012).

B. Infringement Contentions and Discovery

On July 24, 2012, the Court held a scheduling conference for the newly transferred case. The hearing addressed the schedule for claim construction and discovery. In addition, the Court told Oplus to "come forward right away with infringement contentions," noting that because the Court had not "seen any infringement contentions," the Court had been left "in limbo" on scheduling. Doc. No. 84, 12:15–16, 18:16–17. Addressing Mr. Opatken's concerns about discovery, the Court specified, "You are going to file infringement contentions . . . . [T]he initial [contentions] will give you the right to inquire about those contentions." *Id.* at 27:17–22. After the parties filed a supplemental schedule, the Court ordered the entry of the stipulated schedule, which set the deadline for initial infringement contentions for August 9, 2012. *See* Doc. Nos. 82, 86.

On March 20, 2013, the parties submitted a joint statement indicating that serious problems had arisen during the course of discovery. Doc. No. 114. In the Joint Stipulation Re: Oplus' Motion to Compel Production of Documents, Oplus asked the Court to compel Vizio to respond to interrogatories and requests for

production. *Id*. Vizio submitted letter correspondence indicating that it had found Oplus's infringement contentions "ambiguous," "inconsistent," and "deficient," leaving Vizio unable to "ascertain the true scope" of the infringement contentions and thereby the discovery requests directed to evidence of infringement. *Id*., Ex. 2 ("Oplus is not entitled to any discovery of Vizio's products until it fulfills its obligations to provide claim charts that clearly identify the allegedly infringing technologies and apply the claims as written.") (emphasis omitted). The Court denied Oplus's motion to compel, noting that "where contentions are inadequate, courts have not only limited discovery, they have denied it entirely." In the "morass of unstructured discovery caused by these inadequate infringement contentions," the Court could not justify allowing such discovery.

Rather than amend its infringement contentions,[1] however, Oplus subpoenaed a plaintiff from the IP Innovation Case for all pleadings and deposition files, including accompanying exhibits, "retained by Outside Counsel pursuant to the Protective Order" issued in the IP Innovation Case. *See* Doc. No. 126, Ex. 5. According to Oplus, Oplus sought "information about sales, notice of the patents-in-suit, and VIZIO's use of specific products," information that Oplus said it was entitled to regardless of the state of its infringement contentions because such information was "unrelated to infringement." *See* Doc. No. 127 at 7, 12. Oplus protested that if the Court's order prevented Oplus from obtaining this information, the order was "the epitome of 'rogue.'" *Id*. at 6.

At the hearing for the protective order, Vizio aptly summarized Oplus's move: "Oplus essentially ignored the April 3rd order and subpoenaed itself for files it had in its possession as a result of a retention clause in a previous case" and, in doing so, violated the order protecting discovery in the IP Innovation Case. Transcript of

[1] Prior to the Court's order on the motion to compel, Oplus sent a letter to opposing counsel answering several questions regarding its infringement contentions. See Doc. No. 126, Ex. C. Oplus states that it believed the letter met the requirements of the Court's subsequent order and made no changes to its infringement contentions after the order issued.

June 7, 2103 Hearing, 4:7–10 (“June 7, 2013 Hearing”). Oplus countered that it had only used publically available information on PACER to tailor its subpoena, *id*. at 4:13–18, 9:6–8, which contained only one broad request. *See also id*. at 44:24–45:1 (“To be clear, no documents of Vizio from the [IP Innovation Case] have been viewed by any counsel for Oplus.”). Oplus simultaneously told the Court that the subpoena had been narrowly tailored and only sought a “narrow subset” of the IP Innovation Case discovery. “[T]he materials in the [IP Innovation Case] were vetted and broken down from a larger universe of materials . . . . We’re specifically seeking only a subset of those materials.” *Id*. at 11:15–20.

While Oplus was preoccupied with telling the Court that all it wanted was to find out whether this is “a billion [dollar] case, or is this a thousand dollar case,” Oplus neglected to pursue third-party discovery to support its initial claim of infringement. June 7, 2103 Hearing, 38:16–19. Oplus declined to accept a confidentiality agreement in order to allow their expert access to the source code for an allegedly infringing MediaTek chipset. Declaration of Charles C. Koole, Doc. No. 196, Ex. Z. Oplus sought no information from the third party manufacturers of the other two accused chipsets. Instead, in the face of Vizio’s denial and Oplus’s own argument before the MDL panel, Oplus continued to insist that Vizio must have evidence of its alleged infringement in its possession.

C. Validity and Noninfringement Motions

Prior to the claim construction hearing, Vizio moved for summary judgment as to invalidity under 35 U.S.C. §§ 101, 112. In opposing Vizio’s early motion, Oplus offered expert testimony stating that “[a]n absolute value of a linear combination is a linear combination” and could be properly viewed as “a linear combination followed by an absolute value operator.” Declaration of Kara L. Szpondowski in Support of Plaintiff’s Response to Defendant’s Motion for Summary Judgment, Ex. 10, Doc. No. 108. The Court issued its claim construction order and denied Vizio’s early summary judgment and held that the

’842 and ’840 Patents claiming patent eligible subject matter and were not indefinite. Claim Construction Order, Doc. No. 104; Order Denying Vizio’s Motion for Summary Judgment, Doc. No. 113.

After the Claim Construction Order issued and discovery closed, Vizio again moved for summary judgment. In two separate motions, Vizio moved the Court to find that the asserted claims of the ’842 Patent were anticipated, the asserted claims of the ’840 Patent were invalid for lack of written description and enablement, and Oplus had failed to show infringement of both the ’842 and ’840 Patents. Doc. Nos. 148, 150.

Oplus responded to the invalidity motion by parsing out the algorithms presented in the allegedly anticipating references and explaining how the algorithms did not meet the requirements of the asserted claims. Doc. No. 159 at 6–12. In doing so, Oplus relied on expert testimony from J. Carl Cooper. Certain portions of Mr. Cooper’s testimony, however, contradicted expert testimony from Richard Ferraro provided by Oplus in opposition to Vizio’s first summary judgment motion. *See* Vizio’s Reply in Support of Its Motion for Summary Judgment of Invalidity, Doc. No. 167 at 3–6. Where Mr. Ferraro had stated “An absolute value of a linear combination is a linear combination,”[2] Mr. Cooper opined that a reference that disclosed an absolute value of the linear combination of two spatial pixels was no longer a linear combination and therefore did not anticipate the asserted claim. Expert Report of J. Carl Cooper, Doc. No. 159, Ex. 5 at ¶ 89.

Oplus responded to the noninfringement motion by setting forth the bare bones evidence it had relied on early in its case, including product manuals indicating the chipset used in Vizio’s television. Although Oplus had admitted numerous times during the case that other methods and algorithms could perform deinterlacing and

[2] Oplus argued that “no such phrase is found in Mr. Ferraro’s declaration at th[e] paragraph” cited by Vizio. Response to Vizio’s Motion for Summary Judgment of Noninfringement, Doc. No. 159 at 12. Rather, the statement appeared in the heading above the paragraph cited by Vizio.

error correction, Oplus argued that the existence of an interlaced signal input and film-source detection capabilities in Vizio's televisions necessarily showed infringement of the asserted claims. *See* Response to Vizio's Motion for Summary Judgment of Noninfringement, Doc. No. 171 at 6–11 ("Opposition to Noninfringement MSJ"). Vizio pointed out that Oplus had the burden of presenting material facts sufficient to show an underlying act of infringement. *See* Vizio's Memorandum of Points and Authorities in Support of Its Motion for Summary Judgment of Noninfringement, Doc. No. 148 ("Nor can Oplus show that any end-user of the accused televisions directly infringed by performing the claimed methods, also a prerequisite of indirect infringement."). Instead of providing such facts, Oplus accused Vizio of "barely address[ing] Oplus' infringement position," and utterly failed to provide any evidence or factual support showing that the steps of the asserted methods were performed as required to show infringement. Opposition to Noninfringement MSJ at 6.[3]

During the briefing schedule for Vizio's second motion for summary judgment, Oplus moved the Court to compel Vizio to supplement its responses to certain interrogatories and requests for production. *See* Joint Stipulation Re: Oplus' Motion to Compel Discovery, Doc. No. 156 ("Second Oplus Motion to Compel"). Oplus had propounded a discovery request on Vizio seeking identification of all Vizio products using the three chipsets identified in Oplus's infringement contentions; Vizio had responded with a list of several product identification numbers. *Id*. at 8. Oplus wanted more: "Oplus requests that VIZIO simply identify ***all*** of its products since 2006 and indicate the video processing chipsets incorporated into each product." *Id*. at 11 (emphasis added). Not only was Oplus not entitled to the discovery it sought to compel, *see* Doc. No. 183 at 22–23, but

[3] A review of Oplus's opposition to the motion for summary judgment on infringement shows that Oplus does not even mention several steps of the claimed method, including the performance of the logical operations and Markush group elements.

Oplus had never requested it. The remaining discovery requests for sales and profit information suffered from the same problem.

Oplus's statements in the motion to compel were seriously contradictory and unreasonable. Oplus's motion requested that the Court compel sales information for "each VIZIO product that uses one of the accused technologies (as determined through VIZIO's supplementation of its response to Interrogatory No. 1)." *Id*. at 28. And Interrogatory No. 1, according to Oplus, requested information from Vizio for "all of [Vizio']s products since 2006 and indicate the video processing chipsets incorporated into each product." *Id*. at 12 (emphasis omitted). Yet Oplus simultaneously contended that it "simply request[ed] sales information ***for the televisions that use the technologies at issue in this case***." Second Oplus Motion to Compel at 26 (emphasis added). Since Oplus sought to compel the responses simultaneously, Oplus necessarily sought sales information for all post-2006 Vizio products.

On October 2, 2013, the Court granted in part and denied in part Vizio's motions for summary judgment of invalidity, granted in full Vizio's motion for summary judgment of noninfringement, and denied Oplus's motion to compel discovery. Doc. No. 183. The Court then entered final judgment in favor of Vizio. Doc. No. 185.

III. DISCUSSION

A. 35 U.S.C. § 285: Exceptional Case

Under 35 U.S.C. § 285, a "court in exceptional cases may award reasonable attorney fees to the prevailing party." First, the court must determine that the party seeking to recover attorney fees is a prevailing party. *See Highmark, Inc. v. Allcare Health Management Sys., Inc.*, 687 F.3d 1300, 1308 (Fed. Cir. 2012), *cert. granted Highmark, Inc. v. Allcare Health Management Sys., Inc.*, 134 S. Ct. 48 (2013). Vizio won a judgment of noninfringement of the asserted claims of the '842 and '840 Patents and won a judgment of invalidity on the '842 Patent. Vizio

is the prevailing party in this litigation. The prevailing party must then show by clear and convincing evidence that the case is exceptional. *Id.*

1. Oplus Engaged In Litigation Misconduct

"A case may be deemed exceptional under § 285 where there has been 'willful infringement, fraud or inequitable conduct in procuring the patent, misconduct during litigation, vexatious or unjustified litigation," or other similar infractions. *MarTec, LLC v. Johnson & Johnson*, 664 F.3d 907, 916 (Fed. Cir. 2012) (*quoting Serio-US Indus., Inc. v. Plastic Recovery Techs. Corp.*, 459 F.3d 1311, 1321–22 (Fed. Cir. 2006)). "Litigation misconduct alone may suffice to make a case exceptional." *Monolithic Power Sys., Inc. v. O2 Micro Int'l Ltd.*, 726 F.3d 1359, 1366 (Fed. Cir. 2013); *see also Taltech Ltd. v. Esquel Enters. Ltd.*, 604 F.3d 1324, 1329 (Fed. Cir. 2010) ("Litigation misconduct and unprofessional behavior are relevant to the award of attorney fees, and may suffice to make a case exceptional.").

A finding of litigation misconduct need not rest on an "isolated instance[] of unprofessional behavior." *Monolithic*, 726 F.3d at 1369. "An abusive pattern or vexatious strategy that [is] pervasive enough to infect the entire litigation" may constitute litigation misconduct. *Id.* Accordingly, the Court must determine whether Oplus's behavior in this case rises to the level of misconduct by considering the totality of the circumstances. *Cf. Yamanouchi Pharm. Co. v. Danbury Pharmacal, Inc.*, 231 F.3d 1339, 1347 (Fed. Cir. 2000). Certainly, the manner and style of Oplus's counsel was offensive to the Court,[4] but that alone is insufficient to find litigation misconduct.

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[4] During one hearing, the Court felt compelled to tell Oplus's counsel, "Let me just give you a word of caution here. I don't want you to be quite as aggressive as you have been in addressing the Court." June 7, 2013 Hearing at 51:2–4. The Court has rarely been called upon to admonish counsel in this way.

a. Oplus delayed the litigation by strategically amending its claims to manufacture venue.

From the beginning of this case, Oplus flouted the standards of appropriate conduct and professional behavior. By listing only one additional product from a manufacturer other than Vizio, Oplus provided only the most tenuous basis in its initial complaint for bringing suit in Illinois. Oplus's first amended complaint took its first step over the boundaries of professionalism. Oplus specifically removed the allegation of "use" of the patents by defendant Sears. Because the patents only contained method claims, this selective amendment rendered its allegations against Sears prima facie inadequate. Yet when Sears and Vizio challenged the appropriateness of the venue, Oplus not only opposed transfer, but asked the MDL panel to return the case to Illinois after it lost. Certainly, counsel must fight zealously for the rights of its clients,[5] but no ethical canon requires counsel to ignore well-settled law.

b. Oplus misused the discovery process to harass Vizio by ignoring necessary discovery, flouting its own obligations, and repeatedly attempting to obtain damages information to which it was not entitled.

At the scheduling conference, Oplus began implementing its abusive discovery strategy: avoid its own litigation and discovery obligations while forcing its opponent to provide as much information as possible about Vizio's products, sales, and finances. Despite the Court's clear message to Oplus that it would not obtain discovery until it filed infringement contentions, Oplus managed to avoid filing infringement contentions with the Court until June 14, 2013—more than ten months after the initial deadline for infringement contentions.

[5] The Court notes that Oplus's counsel, based in Chicago, stood to benefit from preventing transfer out of the Northern District of Illinois. Oplus is an Israeli corporation and no evidence suggests that the Northern Illinois forum would have been particularly convenient for Oplus itself.

Oplus's delay in providing and filing adequate infringement contentions led to the parties' first discovery dispute. Vizio refused to produce discovery on infringement without clear contentions allowing Vizio to determine what material might be discoverable. Oplus's protest, that Vizio should have challenged its infringement contentions earlier on its own motion, was weakened by its own behavior. Where Oplus had failed to file its infringement contentions, Vizio's failure to challenge those same contentions by motion practice is understandable.

Oplus's failure to amend and file its infringement contentions after the Court's ruling on the first motion to compel, however, is less understandable. Oplus's subsequent subpoena defied the Court's order. Oplus's belief that a letter sent before the Court's order and never provided to the Court resolved the issue was at best severely misguided and at worst disingenuous and pretextual.

Of greatest concern to the Court, however, was Oplus's counsel's subpoena for documents counsel had accessed under a prior protective order. Oplus disavowed any review and use of confidential information. Its actions and statements undermine that disavowal. First, Oplus's statement that the subpoena had been narrowly tailored and only sought a "narrow subset" of the IP Innovation Case discovery directly contradicts Oplus's assertion that it hadn't reviewed confidential information. If no review had occurred, Oplus could not have known what narrow subset of discovery to seek. Second, three of the same attorneys for Oplus had worked on the IP Innovation Case. Even if Oplus's counsel did not use that knowledge to tailor the subpoena's single broad request, Oplus's counsel's knowledge of the contents of Vizio's confidential discovery affected the decision to issue the subpoena.[6] Oplus did not subpoena files from any other Vizio

[6] Although Oplus asserts that it has relied only on publically available information, it has clearly not done so. For example, at a telephonic status conference following the motion to compel, Mr. Gasey confusingly stated that he knew Vizio had certain documents because they had been produced in the IP Innovation Case but that he also hadn't accessed the IP Innovation Case discovery. See Transcript of June 25, 2013 Telephonic Status Conference, Doc. No. 145 at 7:16:20 ("Well, that was interesting because [the television service manuals were] some of the material that was produced in the [IP Innovation Case]. I can't give you the details on that; but contrary to what [Vizio's counsel] is asserting, we haven't accessed that information."). Although Oplus provided the pre-trial lists of

litigation, which strongly implies that Oplus's counsel had specific information in mind in making its discovery request. Oplus's claim that it issued the subpoena without using any knowledge by three attorneys as to the content of the discovery sought simply strains credulity.

The discovery strategy of obtaining as much information about Vizio's finances as possible resulted in an inversely proportionate amount of time spent obtaining discovery on the fundamental infringement issues. Oplus knew throughout the litigation that other methods were available to accomplish deinterlacing and error correction. During discovery, not only did Oplus decide not to pursue third-party discovery pertaining to the algorithms used by the allegedly infringing products, it refused to sign a protective order to allow Vizio access to such discovery.

Oplus's final motion to compel discovery was, like the prior discovery motions, ill-timed, burdensome, and inappropriate. In its final attempt to gain Vizio's business and financial information, Oplus blatantly misinterpreted its own prior discovery requests in an attempt to obtain the same information the Court had previously refused to compel. Oplus knew it was not entitled to the information it wanted. Instead, Oplus requested everything and falsely represented to the Court the scope of its own request.

c. Oplus used improper litigation tactics including presenting contradictory expert evidence and infringement contentions as well as misrepresenting legal and factual support.

Standing alone, a party's misrepresentation of the law does not constitute litigation misconduct. *See MarTec*, 664 F.3d at 920. Oplus certainly abused and twisted its statements of law to the Court. In one brief, Oplus quoted a legal standard: "Where a defendant seeks summary judgment of noninfringement, "nothing more is required than the filing of a ... motion stating that the patentee

evidence in the IP Innovation Case, which listed several television service manuals, a review of the IP Innovation Case docket shows no publically available information stating that Vizio was the source of the manuals.

had no evidence of infringement and pointing to the specific ways in which accused [products] did not meet the claim limitations." Doc. No. 160 at 5. In the next breath, Oplus declared that Vizio had "not met its burden" because Vizio did not know how the accused products work and could therefore not point out the required deficiencies. *Id*. at 6. Oplus wanted the Court to believe that the issue of knowledge of the infringing device was settled law, when it was not so at all. And Oplus consistently twisted the Court's instructions and decisions.[7] Clever wording and implication cannot conceal Oplus's attempts to mislead the Court.

Moreover, Oplus perpetuated this same abuse on the facts it submitted in support of its motions. Oplus regularly cited to exhibits that failed to support the propositions for which they were cited. Oplus's disavowal of its own expert's statement when Vizio cited the paragraph, rather than the paragraph heading, is merely one example of Oplus's strategic manipulation of the facts and evidence provided to the Court. Oplus also employed another strategy for avoiding undesirable facts: ignore them. When Oplus had no evidence of infringement of one element of a claim, it simply ignored that element and argued another.

Additionally, Oplus's malleable expert testimony and infringement contentions left Vizio in a frustrating game of Whac-A-Mole throughout the litigation. One expert popped up to contradict Vizio on one motion: an absolute value of a linear combination is a linear combination. As that expert disappeared, the next expert popped up, saying that the first expert could not have meant what he said. Oplus's infringement contentions cite a patent to show infringement, yet their expert testifies that the same patent did not disclose the methods of Oplus's patents.

Oplus's other stunts, like unilaterally filing the initial joint status report and not consulting Vizio before issuing the subpoena, only further fueled the harassing and

[7] Oplus's delay in filing infringement contentions and Oplus's portrayal of this Court's so-called "rogue" order are two examples of Oplus's misinterpretations of the Court's words. At the June 7, 2013 hearing, the Court, frustrated with Oplus's inability to correctly follow its instructions, asked Oplus's counsel twelve separate times if Oplus understood or was unclear about various statements made by the Court. *See* June 7, 2013 Hearing.

vexatious nature of the litigation. Oplus's tactics in this litigation have been vexatious and meet the standard for litigation misconduct.

2. Oplus's Claims Against Vizio Were Not Objectively Baseless

The court can alternatively award attorney fees "if the litigation is both: (1) brought in subjective bad faith; and (2) objectively baseless." *MarTec*, 664 F.3d at 916. An objectively baseless position must have no objective foundation. *Id*. The bad faith standard is equally stringent, requiring both that "no reasonable litigant could expect success on the merits" and that "lack of objective foundation for the claim was either known or so obvious that is should have been known by the party asserting the claim." *Highmark*, 687 F.3d at 1309 (quotations omitted).

Oplus's allegations against Vizio, at the time of the filing of the complaint, were not objectively baseless. Although Oplus knew that Vizio claimed to be unaware of the signal processing methods employed in its television, as required for indirect infringement, Oplus did not know that Vizio had discontinued all of the allegedly infringing televisions prior to the filing of its complaint. Vizio itself did not make the Court aware of this fact until at least a year into the litigation. Oplus included proper allegations of both direct and indirect infringement. The Court ultimately disagreed with Oplus's argument that Vizio could be liable for indirect infringement without knowledge of its products' signal processing methodology, but the argument had a reasonable basis in fact and law.

Oplus's allegations against Sears were objectively baseless at the time Oplus filed its first amended complaint. Since the case against Sears remains pending in the Northern District of Illinois, however, that forum would be the most appropriate venue in which to seek sanctions for claims against Sears. *See, e.g.*, *Highmark*, 687 F.3d 1300, 1319 (Fed. Cir. 2012).

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3. The Court Determines That An Award Of Attorney Fees Under 35 U.S.C. § 285 Is Not Appropriate In This Case

Since the Court deems this case exceptional due to Oplus's litigation misconduct, the court must determine, in its discretion, if an award of attorney fees is appropriate and the amount of the award. *Id*. at 1308. The amount of the award must "take into account the particular misconduct involved." *Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1553 (Fed. Cir. 1989). Any award is remedial in nature and should compensate the prevailing party when failing to shift fees would be a gross injustice. *Kilopass Tech., Inc. v. Sidense Corp.*, 738 F.3d 1302, 1313 (Fed. Cir. 2013). Further, an award under § 285 should only include expert witness fees if the court determines that attorney fees alone are "insufficient to sanction the patentee." *MarTec*, 664 F.3d at 921.

The Court declines to award attorney fees to Vizio for Oplus's litigation misconduct. Although Oplus's behavior has been inappropriate, unprofessional, and vexatious, an award of attorney fees must take the particular misconduct into account. This case has been fraught with delays and avoidance tactics to some degree on both sides. However, Vizio is right in using Oplus's inconsistent statements to strengthen its arguments on summary judgment. At each step of the case, Vizio's credibility inevitably increased while Oplus gathered rope to hang itself.

Other than the three discovery motions, each instance of motion practice occurred according to normal litigation practice. There is little reason to believe that significantly more attorney fees or expert fees have been incurred than would have been in the absence of Oplus's vexatious behavior. Oplus alleged sufficient facts to support its claims, gathered limited discovery, and lost on summary judgment, as it would have even without its misconduct. As to the three discovery motions, Vizio itself brought and won one of the three discovery motions. At no point did the parties seek discovery sanctions under Fed. R. Civ. Proc. 37. The

Court further believes that, given the confusing state of contention filings and discovery, the first two discovery requests were substantially justified under the rule.

Ultimately, the Court must determine if an award of fees is appropriate under the statute. Given that the litigation followed an expected course of motions practice, and that discovery sanctions were available to Vizio, there is no gross injustice in failing to award of attorney fees in this case. The Court, in its discretion, therefore declines to award attorney fees and expert fees to Vizio.

B. 28 U.S.C. § 1927: Attorney Sanctions

Under 28 U.S.C. § 1927, "[a]ny attorney . . . who so multiplies the proceedings in any case unreasonably and vexatiously may be required by the court to satisfy personally the excess costs, expenses, and attorneys' fees reasonably incurred because of such conduct." In order to impose sanctions under § 1927, counsel must have acted with bad faith. *See Baldwin Hardware Corp. v. FrankSu Enterprise Corp.*, 78 F.3d 550, 561 (Fed. Cir. 1996); *New Alaska Dev. Corp. v. Guetschow*, 869 F.2d 1298, 1306 (9th Cir. 1989). "Bad faith is present when an attorney knowingly or recklessly raises a frivolous argument or argues a meritorious claim for the purpose of harassing an opponent." *Trulis v. Barton*, 107 F.3d 685, 694 (9th Cir. 1995) (quotations omitted). "For sanctions to apply," a filing must either be frivolous and submitted recklessly or "be intended to harass." *In re Keegan Mgmt. Co., Sec. Litig.*, 78 F.3d 431, 436 (9th Cir. 1996). "Thus, . . . reckless nonfrivolous filings, without more, may not be sanctioned." *Id*.

As discussed with respect to 35 U.S.C. § 285, although Oplus unquestionably pursued a vexatious and harassing litigation strategy, no single filing was clearly frivolous or employed with the purpose of harassing Vizio. Although the Court has ample evidence of Oplus's litigation misconduct, there is no evidence suggesting that Oplus's behavior stemmed from bad faith or a sufficient intent to harass. Instead, Oplus pursued a weak case in a manner that was overly

aggressive, uncooperative, and outside the boundaries of professional behavior. The proper tool to sanction behavior of this kind is found in the Federal Rules of Civil Procedure and the patent fee shifting statute, not 28 U.S.C. § 1927.

C. The Court's Inherent Power to Sanction Misconduct

Under its inherent power, a federal court may sanction attorney or party misconduct by "assess[ing] attorney's fees when a party has acted in bad faith, vexatiously, wantonly, or for oppressive reasons." *Chambers v. NASCO, Inc.*, 501 U.S. 32, (1991). In addition, the court may award expert fees as a sanction against a party who has litigated vexatiously or in bad faith. *Takeda Chem. Indus., Ltd. v. Mylan Labs., Inc.*, 549 F.3d 1381, 1391 (Fed. Cir. 2008).

Where, as here, other tools for sanctioning behavior exist and apply to the party's misconduct, it would be a mistake for the Court to use its inherent power. "[T]he court ordinarily should rely on [statutory authority] rather than inherent power." *Chambers*, 501 U.S. at 50. "Use of this inherent authority is reserved for cases where the district court makes a finding of fraud or bad faith whereby the very temple of justice has been defiled," *MarTec*, 664 F.3d at 921 (quotations omitted), or when statutory authority does not provide an adequate sanction, *see Chambers*, 501 U.S. at 50. Because the Court has declined to award sanctions under its statutory authority, the Court has no need to exercise its inherent power.

IV. CONCLUSION

The Court finds that clear and convincing evidence supports the finding that Oplus and its counsel engaged in a vexatious litigation strategy constituting litigation misconduct. However, in its discretion, the Court declines to award attorney fees under 35 U.S.C. § 285. The Court denies Vizio's Motion for Attorneys' Fees and Expert Witness Fees.

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IT IS SO ORDERED.

DATED: February 3, 2014

Mariana R. Pfaelzer

Hon. Mariana R. Pfaelzer
United States District Judge

Links: 148, 150, 156

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION; VIZIO, INC., Defendants.	Case No. 2:12-cv-05707-MRP-Ex **Order Granting in Part and Denying in Part Defendant Vizio, Inc.'s Motion for Summary Judgment of Invalidity, Granting Defendant Vizio's Motion for Summary Judgment of Noninfringement, and Denying Plaintiff Oplus Technologies, Ltd.'s Motion to Compel**

I. INTRODUCTION

Plaintiff Oplus Technologies, Ltd. ("Oplus") has sued Defendant Vizio, Inc. ("Vizio") for infringement of two video signal processing patents: U.S. Patent No. 6,239,842 ("the '842 Patent") and U.S. Patent No. 7,271,840 ("the '840 Patent"). Oplus asserted claims 7, 8, 9, 14, and 15 of the '842 Patent and claims 56–59 and 62 of the '840 Patent. Vizio moves for summary judgment of invalidity as to the asserted claims of the '842 Patent as anticipated under 35 U.S.C. § 102 and as to the asserted claims of the '840 Patent for lack of both written description and enablement under 35 U.S.C. § 112.

II. TECHNICAL BACKGROUND

Modern televisions are complicated electrical systems with numerous internal components that are necessary to allow televisions to receive a wide array of audio and video inputs (for example, analog video signals may be encoded on composite video, S-video, or component video inputs, among others) and generate an appropriate display output. In order to meet this need, televisions include signal processing components that receive input signals and perform processing functions in order to create a display output. Both the ’842 Patent and the ’840 Patent relate to these video signal processing functions. Specifically, the ’842 Patent addresses the process of deinterlacing interlaced video signals. The ’840 Patent addresses the process of correcting errors in streaming digital video signal.

The ’842 Patent describes a method for converting an interlaced video signal into a deinterlaced signal for display on progressive scan displays. A video signal is composed of sequential images called frames that are scanned onto a display at a certain frequency. On a progressive or deinterlaced display, the frame includes a value for every pixel on the display. An interlaced video signal includes frames with pixel values for every other row of pixels, totaling half of the pixels on the display. Each sequential frame includes pixels values for the rows that were not included in the frame before it. The interlaced signal thereby takes advantage of a luminous optical illusion effect in order to increase a perceived frame rate while decreasing the bandwidth required to transmit the video signal. Since not all video displays are capable of scanning pixel rows in the manner required to display interlaced video signal, deinterlacing must be applied to the signal before it may be displayed on progressive televisions. Deinterlacing uses an algorithm to provide values for the pixels in the rows not included in each frame of the interlaced signal.

Oplus asserts two independent claims from the ’842 Patent, claim 7 and claim 14. Claim 7 describes:

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7. A method for de-interlacing an interlaced video format, the method comprising the steps of:

(a) receiving the interlaced video format feature [*sic*] a sequence of fields of pixels to be de-interlaced;

(b) evaluating logical operations of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor'; and

(c) deciding upon assignment of values to missing spatial pixels according to results of said logical operations.

Claim 14 contains a method claim with the same preamble and steps as claim 7, except that a new step (b) is inserted. Steps (b) and (c) of claim 7 are listed as steps (c) and (d) respectively in claim 14. In addition, five instances of the word "said" are added to account for the introduction of new antecedent bases in new step (b), and the word "feature" in step (a) is corrected to read "featuring." New step (b) describes:

(b) using a current spatial field featuring missing spatial pixels and said spatial pixels with known values, located in said sequence of said fields, and one temporal field featuring temporal pixels with known

> values, located in said sequence of said fields, for determining values of said missing pixels of said current spatial field[.]

The ’840 Patent describes a method for determining pixel entropy in a real time streaming digital video image. Video signals, including both interlaced and progressive video signals, may contain various errors or artifacts. Errors may be created by several sources, including deinterlacing or converting the format of the video signal. Error correction is used to reduce or remove the errors in a video signal in order to increase the quality of the video image.

Oplus asserts one independent claim from the ’840 Patent, claim 56. Claim 56 describes the following steps:

> (a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;
>
> (b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and
>
> (c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels . . . .

Step (c) of claim 56 comprises four substeps. Substep (i) describes calculating “pixel inter-local neighborhood parameter” values that each represent a “regional sum of inter-local neighborhood weighted distances.” The remaining substeps describe calculating similar parameter values for virtual pixels, adjusting a pixel entropy counter value for virtual pixels and the two temporally adjacent pixels, and calculating entropy values from the entropy counter values. Substep (iv) further

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requires that the entropy values be used to decide whether or not to use the pixel values for temporally adjacent fields and thereby correct an error in the streaming digital input signal.

Vizio's accused products are all Vizio video products that allegedly perform the methods described in the asserted claims of the '842 and the '840 Patents. In its First Amended Complaint, Oplus identified the Vizio VP505XVT television as an example of a video product that allegedly infringed the '842 Patent and the Vizio P50HDTV10A, VM60P, GV46L and JVP50 televisions as examples of video products that allegedly infringed the '840 Patent. Oplus identified eighteen allegedly infringing Vizio television models in its Infringement Contentions on the basis that the eighteen models used one of three potentially infringing chipsets.

III. LEGAL STANDARD

A. Summary Judgment

The Court shall grant summary judgment if there is no genuine dispute as to any material fact, as supported by facts on the record that would be admissible in evidence, and if the moving party is entitled to judgment as a matter of law. FED. R. CIV. P. 56.; *see Celotex Corp. v. Catrett*, 477 U.S. 317, 322 (1986); *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 250 (1986). In order to grant summary judgment, the Court must identify material facts by reference to the governing substantive law, while disregarding irrelevant or unnecessary factual disputes. *Anderson*, 477 U.S. at 248. The Court must view facts and draw reasonable inferences in favor of the nonmoving party. *Scott v. Harris*, 550 U.S. 372, 378 (2007). If there is any genuine dispute about a material fact such that a reasonable jury could return a verdict for the nonmoving party, summary judgment cannot be granted. *Id.* If the party moving for summary judgment does not bear the burden of proof as to a particular material fact, the moving party need only give notice of the absence of a genuine issue of material fact so that the non-moving party may

come forward with all of its evidence. *Exigent Tech., Inc. v. Atrana Solutions, Inc.*, 442 F.3d 1301, 1307–08 (Fed. Cir. 2006).

B. Noninfringement

Noninfringement is a question of fact. *Crown Packaging Tech., Inc. v. Rexam Beverage Can Co.*, 559 F.3d 1308, 1312 (Fed. Cir. 2009). Summary judgment of noninfringement requires that "after viewing the alleged facts in the light most favorable to the non-movant, there is no genuine issue whether the accused device is encompassed by the claims." *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1304 (Fed. Cir. 1999). "Summary judgment of noninfringement is . . . appropriate where the patent owner's proof is deficient in meeting an essential part of the legal standard for infringement, because such failure will render all other facts immaterial." *TechSearch, L.L.C. v. Intel Corp.*, 286 F.3d 1360, 1369 (Fed. Cir. 2002) (citation omitted).

The legal standard for infringement is exacting. "Comparison of the claims to the accused device requires a factual determination that every claim limitation or its equivalent is found in the accused device." *Int'l Rectifier Corp. v. IXYS Corp.*, 361 F.3d 1363, 1369 (Fed. Cir. 2004). The patent holder bears the burden of establishing infringement. *Exigent Tech.*, 442 F.3d at 1308. Consequently, the patent holder's failure to show the presence of any single claim limitation or its equivalent in the accused products renders summary judgment of noninfringement appropriate.

C. Invalidity under Anticipation

A patent claim is anticipated under 35 U.S.C. § 102(b) if it was "described in a printed publication in this country . . . more than one year prior to the date of application for patent in the United States." Anticipation is a question of fact. *Zenith Elecs. Corp. v. PDI Commun. Sys.*, 522 F.3d 1348, 1356–57 (Fed. Cir. 2008). In order to be anticipated, each and every limitation of the claim must be found in a single prior art reference. *ArcelorMittal France v. AK Steel Corp.*, 700

F.3d 1314, 1322 (Fed. Cir. 2012). Because an issued patent is presumed valid under 35 U.S.C. § 282, the party moving for finding of invalidity bears the burden of showing that each asserted claim is anticipated by clear and convincing evidence. *Titan Tire Corp. v. Case New Holland, Inc.*, 566 F.3d 1372, 1376 (Fed. Cir. 2009). "In practice, the anticipation inquiry is identical to the infringement inquiry, albeit with a clear and convincing standard of evidence." *Rambus Inc. v. Hynix Semiconductor Inc.*, 628 F. Supp. 2d 1114, 1122 (N.D. Cal. 2008).

Since each claim in a patent is entitled to "an independent presumption of validity," every claim "stands or falls independent of the other claims." *Continental Can Co. U.S.A. v. Monsanto Co.*, 948 F.2d 1264, 1266–67 (Fed. Cir. 1991). Accordingly, in order to anticipate a dependent claim, the prior art reference must show every limitation of both the dependent claim and every limitation of the independent claim from which it depends.

D. Invalidity under Lack of Written Description and Lack of Enablement

A patent must be adequately described in writing and enabled under 35 U.S.C. § 112(a). The patent specification must "contain a written description of the invention" that reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date. *Id.*; *see also Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). The written description must support the full scope of the claims as construed. *Energy Transp. Grp., Inc. v. William Demant Holding A/S*, 697 F.3d 1342, 1350 (Fed. Cir. 2012). Furthermore, the specification must "enable" those skilled in the art to make and use the full scope of the claimed invention without undue experimentation. 35 U.S.C. § 112(a); *see also Magsil Corp. v. Hitachi Global Storage Techs., Inc.*, 687 F.3d 1377, 1380 (Fed. Cir. 2012). To determine whether the amount of experimentation is undue, the Federal Circuit has articulated eight factors. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). The written description

and enablement requirement do not require that the patent specification disclose information that is well-known in the art, but the knowledge of a person skilled in the art is there to supplement, not substitute for, a basic enabling disclosure. *Streck Inc. v. Research & Diagnostic Sys., Inc.*, 665 F.3d 1269, 1285, 1288 (Fed. Cir. 2012).

The written description inquiry is a question of fact. *Ariad Pharm.*, 598 F.3d at 1351. Whether a patent is enabled is a question of law based on underlying factual questions. *Streck*, 665 F.3d at 1288. The standard of proof for factual questions in the written description and enablement inquiries is clear and convincing evidence. *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1072–73 (Fed. Cir. 2005); *Streck*, 665 F.3d at 1288.

IV. DISCUSSION

A. Noninfringement of the asserted claims of the ’842 Patent and the ’840 Patent

Vizio is a television company. However, Vizio does not manufacture televisions from scratch. Vizio uses original design manufacturers (“ODMs”) for the internal design of their televisions as well as for television repairs. Statement of Uncontroverted Facts and Conclusions of Law for Vizio’s Motion for Summary Judgment of Noninfringement (“Noninfringement UF”) at 1. ODMs select, procure, and maintain the chipsets used for video processing from chipset manufacturers. *Id.* Vizio itself does not investigate the video processing technology used in its televisions other than by watching a television set before it is distributed. *Id.* at 13. Since Vizio does not investigate the design of its internal components, Vizio knows only basic information regarding each chipset selected by the ODM and does not understand how the accused chipsets work.[1] *Id.* at 2–3.

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[1] Oplus disputes these facts by pointing to service manuals provided to Vizio by component manufacturers, Vizio press releases that advertise chipset functionality, and online product reviews, including one review that states that the reviewer spoke with Calvin Lee, a junior engineer at Vizio, for assistance in understanding frame interpolation. Oplus’ Response to

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Oplus alleges that Vizio directly infringes the asserted claims when it tests the televisions and that Vizio indirectly infringes the asserted claims by providing the televisions to consumers and instructing consumers to use analog video inputs that exclusively allow input of interlaced video signals.

1. Direct Infringement

The asserted claims of the ’842 and ’840 Patents are method claims. A method claim is “directly infringed only when the [method] is performed.” *Joy Techs, Inc. v. Flakt, Inc.*, 6 F.3d 770, 773 (Fed. Cir. 1993). As the accused infringer, Vizio’s burden on a motion for summary judgment for noninfringement is to point to an absence of a genuine issue of material fact. *See Exigent Tech.*, 442 F.3d at 1307–08. Here, Vizio points to an absence of evidence that Vizio used the accused televisions with an interlaced video signal. The asserted independent claims of the ’842 Patent require “receiving the interlaced video format.” The asserted independent claim of the ’840 Patent requires receiving an input signal and assigning a local neighborhood “in a temporal interlaced sequence of three consecutive fields.” Oplus must therefore provide evidence sufficient to show a dispute of material fact as to whether Vizio performed the claim limitations directed to interlaced signals.

Oplus responds by providing a user manual from a Vizio television and a label indicating that Vizio televisions have been tested pursuant to FCC rules, which requires that a device be tested using all external electrical inputs. Oplus does not provide any evidence that Vizio performed the FCC testing or created the user manual. Evidence that a user manual exists and that an unknown party tested the

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Statement of Uncontroverted Facts and Conclusions of Law Re Vizio’s Motion for Summary Judgment of Noninfringement (“Noninfringement RUF”) 1–8. Although this evidence suggests that Vizio knows more about its products than it claims, *see* Noninfringement UF at 2 (“Vizio . . . has no understanding of how its products were designed, developed or work.”), it does not indicate that Vizio knows the details of the chipset operations, including the signal processing algorithms.

television for FCC compliance is not sufficient to create a genuine dispute of material fact as to whether Vizio itself performed the claim limitation of using the accused method with an interlaced signal. Oplus fails to meet its burden to preclude summary judgment in favor of Vizio as to direct infringement.

2. Indirect Infringement

An accused infringer may be liable for indirect infringement by inducing others to infringe a patent or by contributing to the infringement of others. 35 U.S.C. § 271(b)–(c). Both inducement and contributory infringement have several required elements. First, there must be an underlying act of direct infringement. Second, the alleged infringer must either contribute to infringement, i.e., sell or offer to sell a component especially made or adapted for infringing use, or induce infringement, i.e., affirmatively act to facilitate infringement. *See id*.; *Tegal Corp. v. Tokyo Electron Co.*, 248 F.3d 1376, 1378–79 (Fed. Cir. 2001). Third, the accused infringer must have sufficient scienter by either "actively" inducing or "knowingly" contributing to infringement. *Id*. In order to actively or knowingly cause indirect infringement, the alleged infringer must have knowledge of the allegedly infringed patent. *Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S.Ct. 2060, 2067–68 (2011).

Prior to the filing of this lawsuit, Vizio had no knowledge of the patents in suit. Without knowledge of the patents, Vizio could not have had the sufficient mental state required to induce or contribute to infringement. *See Global-Tech*, 131 S.Ct. at 2067–68 ("[A] violator of § 271(c) must know that the combination for which his component was especially designed was both patented and infringing" and the "same knowledge" is required "for liability under § 271(b).") Vizio neither induced nor contributorily infringed the '842 and '840 Patents prior to the filing of Oplus's complaint.[2]

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[2] Oplus states in its briefing that it is not seeking damages for any pre-filing acts of alleged infringement. At the hearing, Oplus clarified that it would not seek *de minimis* damages ***unless*** it

a. Contributory Infringement After the Filing of the Complaint

Vizio has not sold any allegedly infringing Vizio television or any Vizio television incorporating the allegedly infringing chipsets since the date that Oplus filed its complaint. Supplemental Declaration of Charles Koole in Support of Vizio's Motion for Summary Judgment of Noninfringement, Ex. 17 at 2–3. Contributory infringement requires that the alleged contributory infringer "offer[] to sell or sell[]" an apparatus for use in practicing the patented method. Since Oplus has offered no evidence that Vizio sold any allegedly infringing product after the date of filing of the complaint, Oplus has not met its burden to show contributory infringement.

b. Induced Infringement After the Filing of the Complaint

Vizio became aware of the '842 and '840 Patents on December 6, 2011, when Oplus served Vizio with the complaint in this lawsuit. However, even after Vizio became aware of the patents in suit, it never became aware of the actual method and algorithm used by the allegedly infringing chipsets to perform the de-interlacing and error correcting functions. For inducement, the alleged infringer must intend to cause the infringing acts, *see Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1469–70 (Fed. Cir. 1990), such that the culpable conduct encourages infringement. *DSU Med. Corp. v. JMS Co.*, 471 F.3d 1293, 1306 (Fed. Cir. 2006) (Section III.B *en banc*); *see also Manville Sales Corp. v. Paramount Systems, Inc.*, 917 F.2d 544, 553 (Fed. Cir. 1990) ("It must be established that the defendant possessed specific intent to encourage another's infringement and not merely that the defendant had knowledge of the acts alleged

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were able to pursue a claim with additional damages. The Court reminds Oplus that statements of this nature made to the Court may be binding, *see, e.g.*, *Organic Seed Growers and Trade Ass'n v. Monsanto Co.*, 718 F.3d 1350, 1357–58 (Fed. Cir. 2013) (stating that "representations unequivocally disclaim[ing] any intent to sue" had a "similar effect" to a covenant not to sue), and cautions Oplus against disclaiming any portion of its case that it may intend to pursue in the future.

to constitute infringement.”). It is therefore not enough that the alleged inducer acts and thereby causes another to infringe. The alleged inducer must intend to encourage that infringement by its acts. An alleged inducer cannot specifically intend to encourage infringement if it does not know whether or not the induced act would even be an infringing act—the alleged inducer must know that the act it encourages is an act that constitutes infringement. *Cf. Manville*, 917 F.2d at 553–54 (holding that a good faith belief that an underlying act is not infringing negates the specific intent required for inducement).

The Supreme Court has held that an indirect infringer has sufficient knowledge of a patent to induce infringement where the indirect infringer maintains willful blindness to the existence of a patent. *Global-Tech*, 131 S.Ct. at 2068–69. Under the *Global-Tech* rationale, the doctrine of willful blindness should apply equally to the critical fact of underlying infringement and to the critical fact of the existence of a patent.[3] Therefore, an alleged inducer may have sufficient knowledge that it encourages an infringing act if the alleged inducer maintains willful blindness with regard to whether the act it induces constitutes infringement. In order to show willful blindness, the patent holder must show that the alleged inducer “subjectively believed that there is a high probability that a fact exists” and that the alleged inducer “took deliberate actions to avoid learning of that fact.” *Id*. at 2070. If Vizio subjectively believed that there was a high probability that their customers infringed the ’842 and ’840 Patents by using the chipsets in Vizio televisions and deliberately acted to avoid learning the methods and algorithms used by the chipsets, Vizio would have been willfully blind to the infringing acts.

[3] In *Global-Tech*, the Court stated: “Given the long history of willful blindness and its wide acceptance in the Federal Judiciary, we can see no reason why the doctrine should not apply in civil lawsuits for induced patent infringement . . . .” 131 S.Ct. at 2069. However, the *Global-Tech* Court declined to apply the willful blindness doctrine to the induced acts in that case because the question was not at issue. *Id*. at 2070. However, as articulated by the Supreme Court, the rationale appears to apply equally to both types of critical facts.

In the television business, however, the parties do not dispute that the methods and algorithms used by the chipsets are kept as trade secrets by the chipset manufacturers. Noninfringement RUF at 3. Oplus argues that chipset manufacturers occasionally provide service manuals to Vizio, but the evidence shows only that the service manuals are sufficient to allow troubleshooting of the television components. *Id*. Oplus points to no evidence that shows that the service manuals describe the methods and algorithms used by the chipset. In addition, Oplus provides no evidence of Vizio's subjective belief regarding infringement. Vizio instead provides evidence that it subjectively believed it was not infringing the '842 and '840 Patents for two reasons: first, there are numerous other methods of motion adaptive de-interlacing, and second, Vizio believed the '842 and '840 Patents were invalid.[4] Noninfringement RUF at 21–22. The Court finds that Vizio was not willfully blind to the methods and algorithms used by the allegedly infringing chipsets because Oplus has advanced no evidence showing that Vizio subjectively believed that there was a high risk that the chipsets infringed the '842 and '840 Patents or that Vizio took any deliberate steps to avoid learning how the chipsets worked.

B. Invalidity

1. Anticipation of the asserted claims of the '842 Patent

Vizio argues that an article by R. Simonetti published in the journal "IEEE Transactions on Consumer Electronics" ("the Simonetti article")[5] anticipates

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[4] Oplus appears to argue that Vizio could not have had a good faith belief in the invalidity of the '842 and '840 Patents because Vizio's designated 30(b)(6) witness had not reviewed the patents and did not know the basis for Vizio's belief in the invalidity of the patents. Vizio has been represented by counsel since it gained knowledge of the patents, and Vizio's counsel alleged invalidity as an affirmative defense in its answer and provided invalidity contentions by the Court's deadline of September 6, 2012. Oplus's implication that Vizio's corporate witness, and not its legal counsel, should be responsible for its legal opinions is an improper red herring.

[5] R. Simonetti, et al., *A Deinterlacer for IQTV Receivers and Multimedia Applications*, IEEE Transactions on Consumer Electronics, Vol. 39, No. 3 (Aug. 1993).

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independent claim 7 and dependent claims 8 and 9 of the ’842 Patent. The IEEE published the Simonetti article in August 1993, more than five years prior to the filing of the ’842 Patent and more than four years prior to the December 18, 1997 critical date alleged by Oplus.

Claim 7 of the ’842 Patent is directed to deinterlacing an interlaced video format. The Simonetti article states in the abstract that it offers a “deinterlacer for IQTV receivers and multimedia applications.” Although the preamble is not necessarily limiting, the Simonetti article is analogous art that is directed to solving the same problems addressed by the ’842 Patent.

The method of claim 7 comprises three steps. In step (a), an interlaced video signal with sequential fields of pixels is received for the purpose of deinterlacing the signal. In the Simonetti article, the authors describe a “video signal presently received by a standard TV set” and errors produced by the interlaced sampling structure. The Simonetti article states that the algorithm it describes is “capable of converting an image sequence from interlaced to progressive format.” Figure 1 of the Simonetti article shows that the fields are sequential, as shown by the field labels showing that, at a given point in time, there is a previous field, a present field, and a next field. In the “present field” portion of Figure 1, pixel values are shown in alternating horizontal rows, showing visually that the fields represent an interlaced video signal. Each field in Figure 1 is made up of pixels, as shown by labeled pixel X and the surrounding alphabetically enumerated pixels.

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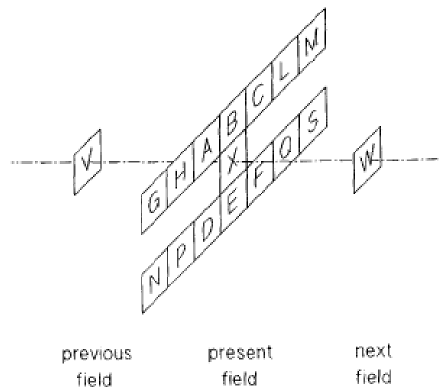


Figure 1: Pixels considered for the interpolation of the pixel X belonging to a missing line.

The Simonetti article at 235. Simonetti therefore describes each of the limitations of step (a).

In step (b) of claim 7, logical operations of linear combinations of values are evaluated. The logical operations are selected from a Markush group including "less than" and "and." The linear combinations of values are selected from a Markush group including "absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels" and "a plurality of constants." Before evaluating Simonetti as prior art to this claim limitation, the Court will address an issue of claim construction. Specifically, the parties disagree as to whether more than one logical operation and more than one linear combination, as opposed to only one logical operation and only one linear combination, must be evaluated in assigning a value to each missing spatial pixel.

Significantly, the terms "logical operations" and "linear combinations" are plural. Therefore, more than one logical operation and more than one linear combination must be evaluated in order for the method to be performed. The signal received in step (a) includes a sequence of fields, each of which has more than one pixel missing an assigned value. Since the method is performed for the purpose of deinterlacing the video signal and step (c) describes assigning "values," i.e., more than one value, to "missing spatial pixels," i.e., more than one spatial

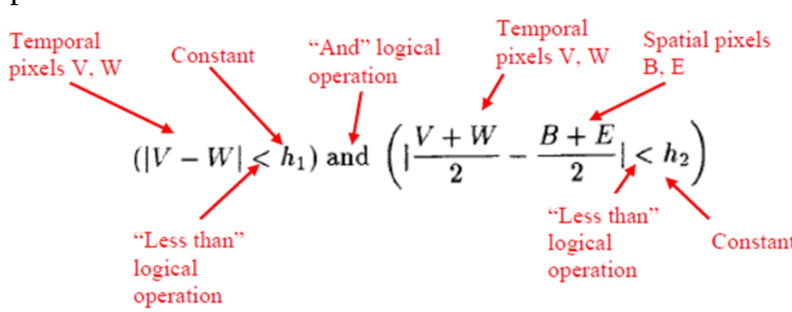
pixel, the plural appears to refer to the need to perform multiple evaluations in order to assigned multiple values to different missing spatial pixels. No language in the claim indicates that the plural terms "logical operations" and "linear combinations" refer instead to multiple evaluations for each individual pixel value.

By using the term "compromising," claim 7 could include a method that used more than one logical operation or more than one linear combination. In addition, the specification describes a preferred embodiment in which multiple linear combinations and "a series of logical operations are evaluated" in order to assign a single missing pixel value, making it unlikely that claim 7 should be construed to ***exclude*** multiple logical operations and linear combinations. However, the method describes determining multiple values for multiple missing pixels. The claim uses no language that would exclude an embodiment in which only one logical operation and only one linear combination are each evaluated in determining a value for only one of the multiple missing pixels in the interlaced video signal. Therefore, the Court construes the term "evaluating logical operations of linear combinations of values" to mean "evaluating one or more logical operations of one or more linear combinations of values for each missing spatial pixel value."

In the Simonetti article, the "possible presence of motion" at the position of a missing spatial pixel is "evaluated" using the following formula:

$$(|V - W| < h_1) \text{ and } \left(\left|\frac{V+W}{2} - \frac{B+E}{2}\right| < h_2\right)$$

The elements of the Simonetti formula correspond to the elements of the two Markush groups of claim 7 as follows:



Simonetti describes evaluating the missing pixel value using the linear combination "absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels" from the Markush group, shown here as $|\frac{V+W}{2} - \frac{B+E}{2}|$. In addition, Simonetti uses the "less than" and "and" logical operators, both of which are listed in the Markush group. Simonetti therefore describes the step of evaluating logical operations of linear combinations of values from the appropriate Markush groups as disclosed in step (b).

In step (c) of claim 7, the "assignment of values to missing spatial pixels" is decided upon "according to results of said logical operations." The Simonetti formula shows a decision tree based upon the following if-then statement:

$$\text{if } \left[(|V - W| < h_1) \text{ and } \left(|\frac{V+W}{2} - \frac{B+E}{2}| < h_2 \right) \right]$$
$$\text{then } X = \frac{V+W}{2}$$

In the –if-then statement, Simonetti uses the results of the logical operations to determine if a condition is met. If the temporally adjacent pixels are sufficiently close in value, and the averages of the temporally and spatially adjacent pixels are sufficiently close in value, the deinterlacer will apply the average of the temporally adjacent pixel values to the missing pixel. The value of the missing pixel X is determined based upon the outcome of the if-then statement. Simonetti therefore describes deciding upon a missing spatial pixel value as disclosed in step (c).

Dependent claim 8 adds the limitation that the "sequence of fields of pixels . . . features a current spatial field featuring missing spatial pixels and said spatial pixels with known values located in said sequence of said fields, and at least one temporal field featuring said temporal pixels with said known values located in said sequence of said fields." Figure 1 of Simonetti shows a "present field" that corresponds to the current spatial field, and the present field shows two rows of pixels with known values, as indicated by pixels labeled alphabetically except X,

which is described as a "missing pixel," and a row of pixels with no known value, as shown by the empty row containing pixel X. Figure 1 of Simonetti also shows a previous field and a next field, each with a known value where missing pixel value X is shown in the present field.

Dependent claim 9 adds an additional limitation to claim 8 that the temporal field with known values is selected from a Markush group including "immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields." Simonetti labels the temporal fields of figure 1 as "previous," "present," and "next," showing that the temporal pixel values are selected from temporally adjacent fields in the sequence of fields.

Independent claim 14 has four steps. Three of the four steps are exactly the same as the steps in claim 7. The additional step, step (b) incorporates the same language as dependent claim 8 and one additional phrase stating that the known pixel values in the temporal field are "for determining values of said missing pixels of said current spatial field." The Simonetti formula shows that the temporal pixel values V and W may be used to calculate the value assigned to the missing pixel by the formula $X = \frac{V+W}{2}$. Dependent claim 15 adds the limitation of claim 9 to claim 14.

The Simonetti article describes every claim limitation in claims 7, 8, 9, 14, and 15 of the '842 Patent. The asserted claims of the '842 Patent are anticipated under 35 U.S.C. § 102(b).[6]

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[6] Vizio also asserts that the '842 Patent is invalid as anticipated by U.S. Patent No. 6,529,637 issued to Carl Cooper, filed March 3, 1995 ("the Cooper Patent"). Since the Court finds that the '842 Patent is anticipated by the Simonetti article, the Court finds the issue of anticipation by the Cooper Patent to be moot.

2. Lack of Written Description Supporting and Lack of Enablement of the Asserted Claims of the '840 Patent

Vizio argues that the specification of the '840 Patent fails to provide adequate written description[7] and does not enable the invention for two reasons. First, claim 56 of the '840 Patent requires "calculating a value of the entropy of each" of several pixels (what Vizio calls "individual pixel entropies") "from said values of said pixel entropy counters of said pixels . . . ." According to Vizio, the '840 Patent does not describe how to calculate pixel entropy values from pixel entropy counters and therefore fails to show that the inventor had possession of the invention and does not enable a person of skill in the art to practice the invention. Second, claim 56 of the '840 Patent requires "calculating values of pixel inter-local neighborhood parameters for each" of several pixels "whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels . . . ." According to Vizio, distances between pixels provide no information about pixel values or pixel entropy and cannot be used to calculate pixel values or entropy. Since claim 56 would therefore be "inoperative as claimed," Vizio argues that it would be "invalid under either § 101 or § 112 of 35 U.S.C." *Raytheon Co.*

[7] Oplus argues that Vizio should be precluded from asserting a defense based on the written description requirement of 35 U.S.C. § 112 ¶ 1 because Vizio did not list written description as a defense in its invalidity contentions. Although Vizio was required to include all its invalidity defenses in its contentions, Oplus was on notice that the written description defense was at issue as of this Court's Order Denying Vizio's Motion for Summary Judgment, Doc. No. 113 (Mar. 4, 2013) ("Order on MSJ for Ineligibility and Indefiniteness") ("To the extent the specification does not recite an exemplary formula for calculating entropy values, it only implicates enablement and written description concerns.") Vizio does not raise an argument that Oplus had no reason to expect; instead, Vizio raises the same argument it previously raised under a new statutory provision as suggested by the Court. Oplus cannot plausibly suggest that these are "new" legal theories of which it was unaware.

v. Roper Corp., 724 F.2d 951, 956 (Fed. Cir. 1983) (holding that an inoperative claim is invalid for lack of utility and for lack of enablement).[8]

i. Pixel Entropy Counter Values

Claim 56 of the ’840 Patent requires calculating a pixel entropy value from a pixel entropy counter value. Oplus asserts that the step of calculating the entropy value for individual pixels from pixel entropy counter values is described in the specification of the ’840 Patent at Cols. 14:17–15:64. That section of the specification describes adjusting an entropy counter value by performing several logical operations and increasing the entropy counter value according to the results of those logical operations. The section continues by describing logical statements evaluating the relationships between the entropy values of individual pixels.

Vizio’s invalidity expert, Dr. Sheila S. Hemami, states that the specification does not describe a method of calculating the entropy value of individual pixels, but instead only describes a method of calculating relative relationships between the entropy values of individual pixels. Oplus’s expert responds that a person of skill in the art would know how to calculate entropy values. Furthermore, the fact that the specification shows the calculation of the relationships between entropy values shows that the applicant assumed a person of skill in the art would be able to calculate entropy values. Vizio’s reply arguing that Oplus has not shown that a person of skill in the art would be able to calculate an entropy value based upon an entropy counter value is not enough to meet Vizio’s burden of providing clear and convincing evidence to overcome the presumption of validity of the ’840 Patent. Oplus does not bear the burden to prove the ’840 Patent valid; Vizio bears the burden to prove it is not.

[8] The Court previously denied Vizio’s motion for summary judgment for invalidity under 35 U.S.C. § 112 ¶ 2 with regard to the problem of inoperability due to the “weighted distances” claim term. Order on MSJ for Ineligibility and Indefiniteness at 32–52.

Dr. Hemami's conclusory statement that "there is no way to correlate the two-variable entropy calculation results with the claimed pixel entropy values" does not clearly establish anything other than the fact that the two parties' experts disagree. Neither party has evaluated the issue of whether a person of skill in the art would be required to engage in undue experimentation in order to practice the invention based on the disclosure. Without such appropriate underlying factual evidence, this Court cannot determine that there is no factual dispute as to the lack of adequate written description or that there is no underlying factual dispute as to lack of enablement.

ii. Inter-local Neighborhood Weighed Distances

Claim 56 of the '840 Patent requires calculating pixel inter-local neighborhood parameter values "represent[ing] a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels." Although the parties characterize the dispute is several different ways, the dispute boils down to a problem of mathematical units. A pixel value, which could include information such as luminance or chrominance, is not defined in units of distance, and a distance measurement alone does not provide relevant pixel value information.

In the specification, the '840 Patent describes adjusting pixel entropy counter values based upon pixel inter-local neighborhood parameter values. The pixel inter-local neighborhood parameter values are represented by distance measurements, and distance measurements between a missing virtual pixel and its defined neighboring pixels, would be constant distances for a fixed grid screen. This breakdown of the calculation of pixel entropy counter values, however, misses several essential components of claim 56. First, the distance is weighted. A weight may be unitless, but it also may have units. A weight may be based on a non-constant value. This Court has not been asked to construe the term "weighted" and will not attempt to do so on the limited record and argument before it. Second, the pixel inter-local neighborhood parameter itself is not an input used

for calculating the pixel entropy counter value; it is used as part of a logical if-then statement. It is a mathematical tautology that the units on either side of an equal sign must be equivalent, but there is no such mathematical tautology for an if-then statement. Any input units may generate any output units. Third, and finally, the output counter units of the if-then statement are used to calculate pixel entropy values. Oplus's expert indicates that a person of skill in the art would know how to calculate pixel entropies. Although the parties present no evidence showing what that calculation would entail, presumably, it can include several inputs and account for various input units.

Vizio has failed to present to the Court clear and convincing evidence that claim 56 as written would result in inoperability of the invention. Dr. Hemami's statement that distance measurements alone "would not and could not yield a measure of" entropy does not account for the full scope of information that would be available to a person of skill in the art upon reading the specification. Accordingly, Vizio has not shown that the phrase "a regional sum of inter-local neighborhood weighted distances" renders claim 56 invalid for lack of written description and lack of enablement.

V. MOTION TO COMPEL DISCOVERY

Oplus moved to compel adequate responses to Interrogatories Nos. 1 and 7 and sufficient documents to respond to Requests for Production Nos. 8, 23, 24, and 25. The interrogatories and requests for production at issue request information and documentation relating to, first, identification of the allegedly infringing Vizio products or Vizio products incorporating allegedly infringing chipsets and second, the annual sales and gross profits for the allegedly infringing products since 2006.

Vizio responded to the first group of discovery requests by identifying the allegedly infringing products; now, Oplus seeks similar information for all of Vizio's products, suggesting that Vizio has not accurately identified allegedly infringing products. Oplus identifies no evidence showing Vizio's response was

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not accurate. In addition, this Court will not allow Oplus to seek discovery regarding products it never accused of infringement. Oplus, as the plaintiff, bears the burden of identifying allegedly infringing products. *See, e.g.*, *Keranos, LLC v. Silicon Storage Tech., Inc.*, No. 2:13-cv-17 (E.D. Tex. Aug. 5, 2013). Consistent with the holding of other courts, this Court will not allow a last minute fishing expedition to find new potentially infringing products. *See Samsung SDI Co. v. Matsushita Elec. Indus. Co.*, No. 05-cv-9493, 2007 WL 4328482, at *2–3 (C.D. Cal. May 17, 2007), *aff'd* 2007 WL 4357552 (C.D. Cal. June 25, 2007). Vizio has identified Vizio products that incorporate the allegedly infringing technology as requested in Interrogatory No. 1 and Request for Production No. 8. Vizio's responses to these requests are sufficient.

Vizio objects to the second group of discovery requests, claiming that the financial information for sales prior to Vizio's knowledge of the patents in suit was irrelevant and that no allegedly infringing products were sold after the filing of the complaint. Oplus admits that the financial information is irrelevant, but contends that the financial information would lead to relevant discovery like damages due to Vizio's direct infringement and elimination of non-recoverable damages from Oplus's total damages calculation. Oplus, however, fails to explain both how sales figures would relate to damages from what Oplus admits is *de minimis* use, *see also Mirror Worlds, LLC v. Apple, Inc.*, 784 F. Supp. 2d 703, 724–25 (E.D. Tex. 2011) (holding that "sales [figures] cannot be used to determine damages for [] direct infringement of method claims"), and from what total damages calculation it would subtract these non-recoverable damages. The financial information for sales prior to the filing of Oplus's complaint would not lead to relevant discoverable information. Vizio has identified and provided financial information relating to sales of the allegedly infringing products after the date of filing of the complaint. Therefore, Vizio's responses to Interrogatory No. 7 and Requests for Production 23, 24, and 25 are sufficient.

VI. CONCLUSION

Having read and considered all of the briefs and arguments of the parties, the Court concludes that Oplus has not shown a disputed issue of material fact exists as to whether Vizio directly infringed the ’842 and ’840 Patents. Oplus has not shown a disputed issue of material fact exists as to whether Vizio possessed the requisite mental state in order to indirectly infringe the ’842 and ’840 Patents. The Simonetti reference anticipates asserted claims 7, 8, 9, 14, and 15 of the ’842 Patent. Vizio has failed to show by clear and convincing evidence that the ’840 Patent lacks sufficient written description to show that the inventor was in possession of the invention at the time of the filing of the application and does not enable a person of ordinary skill in the art to practice the invention. Vizio’s responses to Interrogatories Nos. 1 and 7 and Requests for Production Nos. 8, 23, 24, and 25 are adequate.

The Court therefore **GRANTS** Vizio’s Motion for Summary Judgment of Noninfringement and **GRANTS** Vizio’s Motion for Invalidity of the ’842 Patent, both with prejudice. Further, the Court **DENIES** Vizio’s Motion for Invalidity of the ’840 Patent, and **DENIES** Oplus’s Motion to Compel Discovery.

IT IS SO ORDERED.

DATED: October 2, 2013

Mariana R. Pfaelzer

Hon. Mariana R. Pfaelzer
United States District Judge

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION; VIZIO, INC., Defendants.	CASE NO.: CV12- 5707 MRP (Ex) Hon. Judge Mariana R. Pfaelzer **JUDGMENT IN FAVOR OF VIZIO, INC. OF NONINFRINGEMENT OF U.S. PATENT NOS. 6,239,842 AND 7,271,840 AND INVALIDITY OF U.S. PATENT NO. 6,239,842 (JS-6)**

Plaintiff Oplus Technologies, Ltd. ("Oplus") brought the present action against Defendant VIZIO, Inc. ("VIZIO") alleging infringement of U.S. Patent Nos. 6,239,842 ("the '842 Patent") and 7,271,840 ("the '840 Patent").

Defendant VIZIO's Motion for Summary Judgment of Invalidity of U.S. Patent Nos. 6,239,842 and 7,271,840 and Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 came on for hearing before this Court on September 9, 2013. After considering the moving and opposing papers and all supporting evidence, arguments of counsel, and all other matters presented to the Court, IT IS HEREBY ORDERED, ADJUDGED, AND DECREED THAT:

1. Judgment is entered in favor of Defendant VIZIO and against Plaintiff Oplus, with prejudice, on each of the following grounds:

   a. The '842 Patent is invalid as anticipated by the prior art under 35 U.S.C. § 102(b).

   b. The '842 Patent is not infringed by VIZIO directly or indirectly under 35 U.S.C. §§ 271(a), (b) or (c).

   c. The '840 Patent is not infringed by VIZIO directly or indirectly under 35 U.S.C. §§ 271(a), (b) or (c).

2. Pursuant to Federal Rule of Civil Procedure 54(d)(1) and Local Rules 54-2 and 54-3, Defendant VIZIO is entitled to recover its costs incurred in this action.

3. Any request by Defendant VIZIO for an award of attorneys' fees and related nontaxable expenses under Federal Rule of Civil Procedure 54(d)(2) shall be made pursuant to Local Rule 54-10.

DATED: October 17, 2013

Mariana R. Pfaelzer

Hon. Mariana R. Pfaelzer
United States District Judge

(Ex),APPEAL,CLOSED,DISCOVERY,MANADR,PROTORD

UNITED STATES DISTRICT COURT for the CENTRAL DISTRICT OF CALIFORNIA (Western Division - Los Angeles)
CIVIL DOCKET FOR CASE #: 2:12-cv-05707-MRP-E

Oplus Technologies, Ltd. v. Sears Holdings Corporation et al
Assigned to: Judge Mariana R. Pfaelzer
Referred to: Magistrate Judge Charles F. Eick
Case in other court: Federal Circuit Court, 14-01119
Federal Circuit Court, 14-01131
Federal Circuit Court, 14-01297
Illinois Northern, 1:11-cv-08539
Cause: 35:271 Patent Infringement

Date Filed: 07/02/2012
Date Terminated: 10/17/2013
Jury Demand: Both
Nature of Suit: 830 Patent
Jurisdiction: Federal Question

Plaintiff

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Date Filed	#	Docket Text
12/01/2011	1	COMPLAINT filed by Oplus Technologies, Ltd.; Jury Demand. Filing fee $ 350, receipt number 0752-6616819.(Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/01/2011	2	CIVIL Cover Sheet (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/01/2011	3	NOTIFICATION of Affiliates pursuant to Local Rule 3.2 by Oplus Technologies, Ltd. (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/01/2011	4	Local Rule 3.4 Notice of Claims Involving Patents STATEMENT by Oplus Technologies, Ltd. (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/01/2011	5	ATTORNEY Appearance for Plaintiff Oplus Technologies, Ltd. by Arthur Anthony Gasey (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered:

		12/01/2011)
12/01/2011	6	ATTORNEY Appearance for Plaintiff Oplus Technologies, Ltd. by Raymond P. Niro (Niro, Raymond) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/01/2011	7	ATTORNEY Appearance for Plaintiff Oplus Technologies, Ltd. by Paul Christopher Gibbons (Gibbons, Paul) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/01/2011		CASE ASSIGNED to the Honorable Robert M. Dow, Jr. Designated as Magistrate Judge the Honorable Michael T. Mason. (jn,) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/01/2011)
12/02/2011	8	NOTIFICATION of Affiliates pursuant to Local Rule 3.2 by Oplus Technologies, Ltd. *Amended Notification of Affiliates Pursuant to Local Rule 3.2* (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/02/2011)
12/02/2011	9	Amended Local Rule 3.4 Notice of Claims Involving Patents STATEMENT by Oplus Technologies, Ltd. (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/02/2011)
12/02/2011		SUMMONS Issued as to Defendants Sears Holdings Corporation, Vizio, Inc. (daj,) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/02/2011)
12/06/2011	10	MAILED Patent Report to Patent Trademark Office, Alexandria VA. (tlm) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/06/2011)
12/15/2011	11	SUMMONS Returned Executed by Oplus Technologies, Ltd. as to Sears Holdings Corporation on 12/6/2011, answer due 12/27/2011. (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/15/2011)
12/15/2011	12	SUMMONS Returned Executed by Oplus Technologies, Ltd. as to Vizio, Inc. on 12/6/2011, answer due 12/27/2011. (Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/15/2011)
12/20/2011	13	*First* AMENDED complaint by Oplus Technologies, Ltd. against Sears Holdings Corporation, Vizio, Inc. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Niro, Raymond) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/20/2011)
12/20/2011	14	CORRECTED FIRST AMENDED complaint by Oplus Technologies, Ltd. against Sears Holdings Corporation, Vizio, Inc. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Niro, Raymond) (Docket text modified by Clerk's Office.) Modified on 12/20/2011 (kj,). [Transferred from Illinois Northern on 7/2/2012.] (Entered: 12/20/2011)
01/23/2012	15	MINUTE entry before Honorable Robert M. Dow, Jr: Initial Status hearing is set for 2/27/2012 at 10:45a.m. and parties are to report the following: (1) Possibility of settlement in the case; (2) If no possibility of settlement exists, the nature and length of discovery necessary to get the case ready for trial. Plaintiff is to advise all other parties

		of the courts action herein. Lead counsel is directed to appear at this status hearing. Parties to prepare and submit a joint status report on or before 2/23/2012. (See Judges web page for status report) Mailed notice (tbk,) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 01/23/2012)
02/16/2012	16	ANSWER to amended complaint by Vizio, Inc.(Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/16/2012)
02/16/2012	17	NOTIFICATION of Affiliates pursuant to Local Rule 3.2 by Vizio, Inc. (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/16/2012)
02/17/2012	18	ATTORNEY Appearance for Defendant Vizio, Inc. by Anna Zartler Krasinski (Krasinski, Anna) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/17/2012)
02/17/2012	19	ATTORNEY Appearance for Defendant Vizio, Inc. by Robert David Donoghue (Donoghue, Robert) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/17/2012)
02/17/2012	20	ATTORNEY Appearance for Defendant Vizio, Inc. by Adrian M. Pruetz (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/17/2012)
02/23/2012	21	ATTORNEY Appearance for Plaintiff Oplus Technologies, Ltd. by Gabriel I Opatken (Opatken, Gabriel) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/23/2012	22	ATTORNEY Appearance for Defendant Sears Holdings Corporation by James J. Lukas, Jr (Lukas, James) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/23/2012	23	MOTION by Defendant Sears Holdings Corporation for extension of time to file answer *or otherwise plead [Unopposed]* (Lukas, James) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/23/2012	24	NOTICE of Motion by James J. Lukas, Jr for presentment of motion for extension of time to file answer 23 before Honorable Robert M. Dow Jr. on 3/1/2012 at 09:15 AM. (Lukas, James) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/23/2012	25	ATTORNEY Appearance for Defendant Sears Holdings Corporation by Kevin John O'Shea (O'Shea, Kevin) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/23/2012	26	REPORT of Rule 26(f) Planning Meeting (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/23/2012	27	MOTION by Plaintiff Oplus Technologies, Ltd. for extension of time *for Initial Status Hearing and Related Filing* (Attachments: # 1 Exhibit A: Report of Planning Meeting) (Opatken, Gabriel) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)

02/23/2012	28	NOTICE of Motion by Gabriel I Opatken for presentment of extension of time 27 before Honorable Robert M. Dow Jr. on 2/28/2012 at 09:15 AM. (Opatken, Gabriel) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/23/2012)
02/24/2012	29	RESPONSE by Vizio, Inc. to MOTION by Plaintiff Oplus Technologies, Ltd. for extension of time *for Initial Status Hearing and Related Filing* 27 (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/24/2012)
02/27/2012	30	MINUTE entry before Honorable Robert M. Dow, Jr: Motion for extension of time 23 to answer, to and including 3/19/2012, is granted; Plaintiff's Motion to extend 27 the date of the Initial Status Hearing and the date for the parties related Joint Initial Status Report filing until after March 19, 2012 is granted. Status hearing date of 2/27/2012 is stricken and Status hearing reset for 4/3/2012 at 09:00 AM. Joint initial status report to be filed by 3/30/2012. Notice of Motion date of 3/1/2012 is stricken and no appearances are necessary on that date. Mailed notice (tbk,) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 02/27/2012)
03/19/2012	31	ATTORNEY Appearance for Defendant Sears Holdings Corporation by Adrian M. Pruetz (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/19/2012)
03/19/2012	32	ANSWER to amended complaint by Sears Holdings Corporation(Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/19/2012)
03/19/2012	33	NOTIFICATION of Affiliates pursuant to Local Rule 3.2 by Sears Holdings Corporation (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/19/2012)
03/19/2012	34	ATTORNEY Appearance for Defendant Sears Holdings Corporation by Anna Zartler Krasinski (Krasinski, Anna) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/19/2012)
03/19/2012	35	ATTORNEY Appearance for Defendant Sears Holdings Corporation by Robert David Donoghue (Donoghue, Robert) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/19/2012)
03/20/2012	36	MOTION by Defendant Vizio, Inc. to sever *and transfer claims against VIZIO and stay claims against Sears* (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/20/2012)
03/20/2012	37	MEMORANDUM by Vizio, Inc. in support of motion to sever 36 (Attachments: # 1 Exhibit A-C (Declarations))(Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/20/2012)
03/20/2012	38	NOTICE of Motion by Adrian M. Pruetz for presentment of motion to sever 36 before Honorable Robert M. Dow Jr. on 4/3/2012 at 09:15 AM. (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/20/2012)
03/20/2012		MOTION by Defendant Vizio, Inc. to transfer claims against VIZIO. (Omitted Relief

		from motion 36 . (tlm) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/21/2012)
03/20/2012		MOTION by Defendant Vizio, Inc. to stay claims against Sears. (Omitted Relief from motion 36 . (tlm) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/21/2012)
03/30/2012	39	REPORT of Rule 26(f) Planning Meeting (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 03/30/2012)
04/03/2012	40	MINUTE entry before Honorable Robert M. Dow, Jr: Status hearing held on 4/3/2012. MOTION by Defendant Vizio, Inc. to sever and transfer claims against VIZIO and stay claims against Sears 36 is taken under advisement; Plaintiff's response due by 4/10/2012; Defendant's reply due by 4/17/2012; ruling will be by amil. Mailed notice (tbk,) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 04/03/2012)
04/10/2012	41	RESPONSE by Oplus Technologies, Ltd. to MOTION by Defendant Vizio, Inc. to sever *and transfer claims against VIZIO and stay claims against Sears* 36 (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G)(Gasey, Arthur) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 04/10/2012)
04/17/2012	42	REPLY by Defendant Vizio, Inc. to response to motion, 41 (Pruetz, Adrian) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 04/17/2012)
06/15/2012	43	MINUTE entry before Honorable Robert M. Dow, Jr: Pursuant to Memorandum Opinion and Order, dated 6/15/2012, Vizio's motion to sever and transfer claims against Vizio and stay claims against Sears 36 is granted in its entirety. The claims that Oplus has alleged against Sears are stayed pending the outcome of Oplus' action against Vizio. The Clerk is directed to transfer the claims asserted by Oplus against Vizio to the United States District Court for the Central District of California. Mailed notice (tlm) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 06/18/2012)
06/15/2012	44	MEMORANDUM Opinion and Order entered by the Honorable Robert M. Dow, Jr on 6/15/2012. Mailed notice (tlm) [Transferred from Illinois Northern on 7/2/2012.] (Entered: 06/18/2012)
06/15/2012	45	MINUTE entry before Honorable Robert M. Dow, Jr: In the Court's Memorandum Opinion and Order, the claims that Oplus has alleged against Sears were stayed pending the outcome of Oplus' action against Vizio. This Court places this matter on the suspense calendar pending disposition of the claims asserted by Oplus against Vizio, which were transferred to the United States District Court for the Central District of California. The parties are directed to notify the Court as soon as a dispositive ruling has been issued, at which time the stay will be lifted and case will proceed. Mailed notice Civil case terminated. (tlm) Modified on 6/19/2012 (tlm,). [Transferred from Illinois Northern on 7/2/2012.] (Entered: 06/19/2012)
06/29/2012	46	TRANSFERRED claims against Defendant Vizio, Inc. to the USDC for the Central District of of California the electronic records. (tlm) [Transferred from Illinois Northern

		on 7/2/2012.] (Entered: 06/29/2012)
07/02/2012	47	ORIGINAL file, certified copy of transfer order and docket sheet received from Illinois Northern (Entered: 07/02/2012)
07/02/2012	48	NOTICE OF RECEIPT OF CASE TRANSFERRED IN: Formerly Case Number 1:11-cv-8539 RMD from Northern District of Illinois (Chicago). The above-referenced case has been transferred to this district and assigned the above 2:12-cv-05707 DMG (Ex). (et) (Entered: 07/02/2012)
07/02/2012	49	NOTICE TO COUNSEL RE: Copyright, Patent and Trademark Reporting Requirements. Counsel shall file the appropriate AO-120 and/or AO-121 form with the Clerk within 10 days. (Attachments: # 1 Form AO-120) (et) (Entered: 07/02/2012)
07/02/2012	50	NOTICE TO PARTIES OF COURT-DIRECTED ADR PROGRAM filed. (et) (Entered: 07/02/2012)
07/02/2012	51	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Anna Zartler Krasinski for Defendants Sears Holdings Corporation, VIZIO, Inc. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	52	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Kevin John O'Shea for Defendant Sears Holdings Corporation. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	53	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Robert David Donoghue for Defendants Sears Holdings Corporation, VIZIO, Inc. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	54	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Gabriel I Opatken for Plaintiff Oplus Technologies, Ltd. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately.

		Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	55	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Paul C Gibbons for Plaintiff Oplus Technologies, Ltd. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	56	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Raymond P Niro, Sr for Plaintiff Oplus Technologies, Ltd. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	57	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney James J Lukas, Jr for Defendant Sears Holdings Corporation. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/02/2012	58	NOTICE OF FILING FEE DUE on Pro Hac Vice Application mailed to attorney Arthur Anthony Gasey for Plaintiff Oplus Technologies, Ltd. Your Pro Hac Vice application has not been received by the court. Please return your completed Application of Non-Resident Attorney to Appear in a Specific Case, form G-64, or a copy of the Notice of Electronic Filing of your application and the $325.00 fee and this notice immediately. Out-of-state federal government attorneys who are not employed by the U.S. Department of Justice are required to file a Pro Hac Vice application; no filing fee is required. (et) (Entered: 07/02/2012)
07/05/2012	59	ORDER TRANSFERRING CIVIL ACTION pursuant to Section 3.1 of General Order 08-05. ORDER case transferred from Judge Dolly M. Gee to the calendar of Judge Mariana R. Pfaelzer for all further proceedings. The case number will now reflect the initials of the transferee Judge CV 12-05707 MRP(Ex). Signed by Judge Dolly M Gee and Judge Mariana R. Pfaelzer. (rn) (Entered: 07/05/2012)
07/05/2012	60	NOTICE of Appearance filed by attorney Steven R Hansen on behalf of Defendant VIZIO, Inc. (Hansen, Steven) (Entered: 07/05/2012)

07/05/2012	61	NOTICE of Appearance filed by attorney Christopher Jackson on behalf of Defendant VIZIO, Inc. (Jackson, Christopher) (Entered: 07/05/2012)
07/05/2012	62	NOTICE of Appearance filed by attorney Charles Christian Koole on behalf of Defendant VIZIO, Inc. (Koole, Charles) (Entered: 07/05/2012)
07/06/2012	63	IN CHAMBER MINUTE ORDER by Judge Mariana R. Pfaelzer. The Court sets a Scheduling Conference for Tuesday, July 24, 2012 at 1:30 PM. Since the Answer to Amended Complaint 16 and the Joint Report Rule 26(f) Discovery Plan 26 have been previously filed. If the parties need to file any joint supplemental report it will be due on or before July 17, 2012. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY. (cs) TEXT ONLY ENTRY (Entered: 07/06/2012)
07/11/2012	64	NOTICE of Association of Counsel associating attorney Sean M. Kneafsey on behalf of Plaintiff Oplus Technologies, Ltd.. Filed by Plaintiff Oplus Technologies, Ltd. (Kneafsey, Sean) (Entered: 07/11/2012)
07/11/2012	65	NOTICE of Appearance filed by attorney Sean M Kneafsey on behalf of Plaintiff Oplus Technologies, Ltd. (Kneafsey, Sean) (Entered: 07/11/2012)
07/11/2012	66	NOTICE of Appearance filed by attorney Shaun E Swiger on behalf of Plaintiff Oplus Technologies, Ltd. (Swiger, Shaun) (Entered: 07/11/2012)
07/11/2012	67	REPORT ON THE FILING OF AN ACTION Regarding a Patent or a Trademark (Initial Notification) filed by Oplus Technologies, Ltd.. (Swiger, Shaun) (Entered: 07/11/2012)
07/12/2012	68	APPLICATION for attorney Raymond P. Niro to Appear Pro Hac Vice(PHV Fee of $325 receipt number 0973-10653267 paid.) filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Swiger, Shaun) (Entered: 07/12/2012)
07/12/2012	69	APPLICATION for attorney Arthur A. Gasey to Appear Pro Hac Vice(PHV Fee of $325 receipt number 0973-10653384 paid.) filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Swiger, Shaun) (Entered: 07/12/2012)
07/12/2012	70	APPLICATION for attorney Gabriel I. Opatken to Appear Pro Hac Vice(PHV Fee of $325 receipt number 0973-10653424 paid.) filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Swiger, Shaun) (Entered: 07/12/2012)
07/12/2012	71	APPLICATION for attorney Paul C. Gibbons to Appear Pro Hac Vice(PHV Fee of $325 receipt number 0973-10653478 paid.) filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Swiger, Shaun) (Entered: 07/12/2012)
07/12/2012	72	NOTICE of Appearance filed by attorney Enoch H Liang on behalf of Defendant VIZIO, Inc. (Liang, Enoch) (Entered: 07/12/2012)
07/17/2012	73	APPLICATION of Robert David Donoghue and Anna Zartler Krasinski to Withdraw as Attorney filed by Defendant VIZIO, Inc.. (Attachments: # 1 Proposed Order) (Pruetz, Adrian) (Entered: 07/17/2012)
07/17/2012	74	APPLICATION of Kevin J. O'Shea and James J. Lukas to Withdraw as Attorney filed

		by Defendant Sears Holdings Corporation. (Attachments: # 1 Proposed Order)(Pruetz, Adrian) (Entered: 07/17/2012)
07/17/2012	75	JOINT REPORT Rule 26(f) Discovery Plan *(DEFENDANT VIZIO'S SUPPLEMENTAL 26(F) REPORT)* ; estimated length of trial 4-6 days, filed by Defendant VIZIO, Inc... (Pruetz, Adrian) (Entered: 07/17/2012)
07/17/2012	76	ORDER by Judge Mariana R. Pfaelzer: granting 71 Application to Appear Pro Hac Vice by Attorney Paul C. Gibbons on behalf of Plaintiff, designating Sean M. Kneafsey as local counsel. (lt) (Entered: 07/19/2012)
07/17/2012	77	ORDER by Judge Mariana R. Pfaelzer: granting 70 Application to Appear Pro Hac Vice by Attorney Gabriel I. Opatken on behalf of Plaintiff, designating Sean M. Kneafsey as local counsel. (lt) (Entered: 07/19/2012)
07/17/2012	78	ORDER by Judge Mariana R. Pfaelzer: granting 69 Application to Appear Pro Hac Vice by Attorney Arthur A. Gassey on behalf of Plaintiff, designating Sean M. Kneafsey as local counsel. (lt) (Entered: 07/19/2012)
07/17/2012	79	ORDER by Judge Mariana R. Pfaelzer: granting 68 Application to Appear Pro Hac Vice by Attorney Raymond P. Niro on behalf of Plaintiff, designating Sean M. Kneafsey as local counsel. (lt) (Entered: 07/19/2012)
07/20/2012	80	ORDER GRANTING APPLICATION FOR WITHDRAWAL OF KEVIN JOHN O'SHEA AND JAMES J. LUKAS AS COUNSEL FOR DEFENDANT SEARS HOLDINGS CORPORATIN by Judge Mariana R. Pfaelzer: The Court, having considered the application of Kevin John O'Shea and James J. Lukas to withdraw as counsel in this matter for Defendant Sears Holdings Corporation, the request is hereby GRANTED 74 Application to Withdraw as Attorney. Attorney James J Lukas, Jr and Kevin John O'Shea terminated (bp) (Entered: 07/23/2012)
07/20/2012	81	ORDER GRANTING APPLICATION FOR WITHDRAWAL OF ROBERT DAVID DONOGHUE AND ANNA ZARTLER KRASINSKI AS COUNSEL FOR DEFENDANT VIZIO, INC. by Judge Mariana R. Pfaelzer: The Court, having considered the applications of Robert David Donoghue and Anna Zartler Krasinski to withdraw as counsel in this matter for Defendant VIZIO, Inc., the request is hereby GRANTED 73 Application to Withdraw as Attorney. Attorney Robert David Donoghue and Anna Zartler Krasinski terminated (bp) (Entered: 07/23/2012)
07/24/2012	83	MINUTES OF Scheduling Conference held before Judge Mariana R. Pfaelzer. The case is called and appearance are made. Court and counsel discuss the status of the case, the possibility of consolidation to the MDL, and the status of the Sears defendants (severed and stayed in another district). The Court orders the parties to file a joint stipulation and proposed order on or before Monday, July 30, 2012. Court Reporter: Rosalyn Adams. (cs) Modified on 8/2/2012 (cs). (Main Document 83 replaced on 8/7/2012) (cs). (Entered: 08/02/2012)
07/30/2012	82	JOINT REPORT Rule 26(f) Discovery Plan *(Supplemental)* ; estimated length of trial 4-6 days, filed by Defendant VIZIO, Inc... (Pruetz, Adrian) (Entered: 07/30/2012)

08/10/2012	84	TRANSCRIPT for proceedings held on 07/24/12, 1:30 PM. Court Reporter/Electronic Court Recorder: ROSALYN ADAMS, phone number rosalyn.adams494@gmail.com. Transcript may be viewed at the court public terminal or purchased through the Court Reporter/Electronic Court Recorder before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER. Notice of Intent to Redact due within 7 days of this date. Redaction Request due 8/31/2012. Redacted Transcript Deadline set for 9/10/2012. Release of Transcript Restriction set for 11/8/2012. (Adams, Rosalyn) (Entered: 08/10/2012)
08/10/2012	85	NOTICE OF FILING REDACTED TRANSCRIPT filed for proceedings 07/24/12, 1:30 PM re Transcript 84 THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY.(Adams, Rosalyn) TEXT ONLY ENTRY (Entered: 08/10/2012)
08/21/2012	86	ORDER by Judge Mariana R. Pfaelzer on Joint Stipulation regarding Scheduling 82 is GRANTED and entered (See document for specific dates). (ir) (Entered: 08/23/2012)
08/31/2012	87	IN CHAMBER MINUTE ORDER by Judge Mariana R. Pfaelzer. The Further Scheduling Conference scheduled in this case for 9/10/2012, at 11:00 AM has been taken off-calendar. No appearances are necessary. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY. (cs) TEXT ONLY ENTRY (Entered: 08/31/2012)
10/18/2012	88	NOTICE of Decision: by the Judicial Panel on Multidistrict Litigation Denying Transfer VIZIO, Inc.. (Attachments: # 1 Exhibit A)(Pruetz, Adrian) (Entered: 10/18/2012)
10/29/2012	89	APPLICATION for attorney Daniel R. Ferri to Appear Pro Hac Vice(PHV Fee of $325 receipt number 0973-11174608 paid.) filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Kneafsey, Sean) (Entered: 10/29/2012)
10/29/2012	90	STATEMENT - JOINT CLAIM CONSTRUCTION AND PREHEARING STATEMENT filed by Defendant VIZIO, Inc. (Pruetz, Adrian) (Entered: 10/29/2012)
10/31/2012	91	MINUTE ORDER IN CHAMBERS by Judge Mariana R. Pfaelzer: Pre-Markman Order The parties have submitted a joint claim construction and prehearing statement. ECF No. 90. The Court instructs the parties to adhere to the guidance in this Order for the pending Markman briefs. The parties agree about 90 . (pj) (Entered: 11/01/2012)
11/07/2012	92	ORDER by Judge Mariana R. Pfaelzer: granting 89 Application to Appear Pro Hac Vice by Attorney Daniel R. Ferri on behalf of Plaintiff, designating Sean M. Kneafsey as local counsel. (lt) (Entered: 11/15/2012)
11/20/2012	93	STATEMENT - SUPPLEMENTAL JOINT CLAIM CONSTRUCTION AND PREHEARING STATEMENT filed by Defendant VIZIO, Inc. re: Minutes of In Chambers Order/Directive - no proceeding held, 91 . (Koole, Charles) (Entered: 11/20/2012)
11/26/2012	94	DEFENDANT VIZIO, INC.'S OPENING CLAIM CONSTRUCTION BRIEF filed by Defendant VIZIO, Inc.. regarding Minutes of In Chambers Order/Directive - no proceeding held, 91 , Statement 93 . (Attachments: # 1 Appendix of Asserted Claims, #

		2 Declaration of Charles C. Koole, # 3 Exhibit A to Koole Declaration, # 4 Exhibit B to Koole Declaration, # 5 Exhibit C to Koole Declaration, # 6 Exhibit D to Koole Declaration, # 7 Exhibit E to Koole Declaration, # 8 Exhibit F to Koole Declaration, # 9 Exhibit G to Koole Declaration, # 10 Exhibit H to Koole Declaration, # 11 Exhibit I to Koole Declaration, # 12 Exhibit J to Koole Declaration, # 13 Exhibit K to Koole Declaration, # 14 Exhibit L to Koole Declaration, # 15 Exhibit M to Koole Declaration) (Pruetz, Adrian) (Entered: 11/26/2012)
11/26/2012	95	BRIEF filed by PLAINTIFF Oplus Technologies, Ltd.. *PLAINTIFF OPLUS TECHNOLOGIES, LTD.'S OPENING CLAIM CONSTRUCTION BRIEF* (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3)(Gibbons, Paul) (Entered: 11/26/2012)
12/07/2012	96	IN CHAMBER MINUTE ORDER by Judge Mariana R. Pfaelzer. The Claim Construction Hearing scheduled for 1/7/2013 at 11:00 a.m. has been rescheduled. The Claim Construction Hearing is continued to Thursday, January 10, 2013, at 11:00 a.m. before Judge Mariana R. Pfaelzer. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY. (cs) TEXT ONLY ENTRY (Entered: 12/07/2012)
12/07/2012	97	Notice of Electronic Filing re Text Only Scheduling Notice, 96 e-mailed to cjackson@glaserweil.com bounced due to 550 5.7.1 RESOLVER.RST.NotAuthorized; not authorized. The primary e-mail address associated with the attorney record has been deleted. Pursuant to the General Order and Local Rules it is the attorneys obligation to maintain all personal contact information including e-mail address in the CM/ECF system. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY.(tyw) TEXT ONLY ENTRY (Entered: 12/10/2012)
12/17/2012	98	RESPONSE filed by Plaintiff Oplus Technologies, Ltd.to Brief (non-motion non-appeal), Brief (non-motion non-appeal), Brief (non-motion non-appeal), Brief (non-motion non-appeal) 94 *PLAINTIFFS RESPONSE TO VIZIOS OPENING CLAIM CONSTRUCTION BRIEF* (Gibbons, Paul) (Entered: 12/17/2012)
12/17/2012	99	DEFENDANT VIZIO, INC.'S RESPONSIVE CLAIM CONSTRUCTION BRIEF filed by Defendant VIZIO, Inc.. regarding Brief (non-motion non-appeal) 95 . (Attachments: # 1 Declaration - Supplemental Declaration of Charles C. Koole, # 2 Exhibit N to Supplemental Koole Declaration, # 3 Exhibit O to Supplemental Koole Declaration, # 4 Exhibit P to Supplemental Koole Declaration)(Pruetz, Adrian) (Entered: 12/17/2012)
01/03/2013	100	APPLICATION for attorney Kara L. Szpondowski to Appear Pro Hac Vice(PHV Fee of $325 receipt number 0973-11463514 paid.) filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Kneafsey, Sean) (Entered: 01/03/2013)
01/07/2013	101	NOTICE OF MOTION AND MOTION for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. 101 and 112 filed by

		Defendant VIZIO, Inc.. Motion set for hearing on 2/4/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Memorandum of Points and Authorities, # 2 Appendix A to Memorandum of Points and Authorities, # 3 Appendix B to Memorandum of Points and Authorities, # 4 Statement of Uncontroversial Facts and Conclusions of Law, # 5 Declaration of Charles C. Koole, # 6 Exhibit A to Koole Declaration, # 7 Exhibit B to Koole Declaration, # 8 Exhibit C to Koole Declaration, # 9 Exhibit D to Koole Declaration, # 10 Exhibit E to Koole Declaration, # 11 Exhibit F to Koole Declaration, # 12 Exhibit G to Koole Declaration, # 13 Exhibit H to Koole Declaration, # 14 Exhibit I to Koole Declaration, # 15 Exhibit J to Koole Declaration, # 16 Declaration of Dr. Sheila S. Hemami, # 17 [Proposed] Judgment of Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 under 35 U.S.C. 101 and 112)(Pruetz, Adrian) (Entered: 01/07/2013)
01/09/2013	102	EX PARTE APPLICATION for Order for Briefing Schedule on Vizio, Inc.'s Motion for Summary Judgment filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Declaration of Shaun Swiger, # 2 Exhibit 1, # 3 Proposed Order)(Kneafsey, Sean) (Entered: 01/09/2013)
01/09/2013	103	OPPOSITION to EX PARTE APPLICATION for Order for Briefing Schedule on Vizio, Inc.'s Motion for Summary Judgment 102 filed by Defendant VIZIO, Inc.. (Attachments: # 1 Declaration of Charles C. Koole, # 2 Exhibit A to Koole Declaration, # 3 Exhibit B to Koole Declaration, # 4 Proposed Order)(Pruetz, Adrian) (Entered: 01/09/2013)
01/10/2013	105	MINUTES OF Markman Hearing held before Judge Mariana R. Pfaelzer. The case is called and appearances are made. Court and counsel discuss the claims and terms at issue. The Court takes this matter under submission its order will follow. The hearing on the Motion for Summary Judgment is scheduled for February 27, 2013 at 11:00 a.m. Court Reporter: ANNE KIELWASSER. (cs) (Entered: 01/22/2013)
01/14/2013	104	CLAIM CONSTRUCTION ORDER by Judge Mariana R. Pfaelzer. The Court has reviewed the parties' disputes and has construed eight claim terms from the '840 and '842 patents. (See attached document for table summarizing the Court's findings.) (lom) (Entered: 01/14/2013)
01/15/2013	107	MINUTES (IN CHAMBERS) ORDER Denying Oplus' Ex Parte Application 102 by Judge Mariana R. Pfaelzer: Regarding Vizio's summary judgment motion, ECF No. 101, Oplus has filed an ex parte application requesting a hearing date of March 4, 2013. Oplus's ex parte application is hereby DENIED. The parties must adhere to the following briefing schedule regarding Vizio's summary judgment motion (ECF No. 101): Oplus's Response: February 4, 2013; Vizio's Reply: February 18, 2013; Hearing: February 27, 2013 at 11:00 a.m. (jre) (Entered: 01/25/2013)
01/23/2013	106	ORDER by Judge Mariana R. Pfaelzer: granting 100 Application to Appear Pro Hac Vice by Attorney Kara L. Szpondowski on behalf of Plaintiff, designating Sean M. Kneafsey as local counsel. (lt) (Entered: 01/24/2013)
02/04/2013	108	OPPOSITION to MOTION for Summary Judgment as to Invalidity of U.S. Patents

		Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. 101 and 112 101 filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Declaration Kara L. Szpondowski, # 2 Exhibit A, # 3 Exhibit B, # 4 Exhibit C, # 5 Exhibit D, # 6 Exhibit E, # 7 Exhibit F, # 8 Exhibit G, # 9 Exhibit H, # 10 Declaration Richard Ferraro, # 11 Exhibit 1, # 12 Oplus' Response to Vizio's Statement of Uncontroverted Facts and Conclusions of Law, # 13 Plaintiff's Statement of Genuine Disputes of Material Fact)(Szpondowski, Kara) (Entered: 02/04/2013)
02/12/2013	109	Joint STIPULATION for Extension of Time to File Reply as to MOTION for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. 101 and 112 101 , Order on Ex Parte Application for Order,, 107 filed by Defendant VIZIO, Inc.. (Attachments: # 1 Proposed Order)(Pruetz, Adrian) (Entered: 02/12/2013)
02/13/2013	110	ORDER by Judge Mariana R. Pfaelzer, re Stipulation for Extension of Time to File Response/Reply, 109 Vizio Inc's deadline to file its reply in support extended to Tuesday February 19, 2013 (see attached for further details) (pj) (Entered: 02/14/2013)
02/18/2013	111	REPLY in support of MOTION for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. 101 and 112 101 filed by Defendant VIZIO, Inc.. (Attachments: # 1 Defendant VIZIO, Inc.'s Response to Oplus' Statement of Alleged Genuine Disputes of Material Fact, # 2 Declaration [Supplemental] of Charles C. Koole, # 3 Exhibit K to Supplemental Koole Declaration)(Pruetz, Adrian) (Entered: 02/18/2013)
02/27/2013	112	The case is called and appearances are made. Court and counsel discuss the motion. The Court takes the motion under submission and its order will follow.Court Reporter: Sheri Kleeger. (cs) (Entered: 02/27/2013)
03/04/2013	113	Order Denying Vizio, Inc.'s Motion for Summary Judgment 101 by Judge Mariana R. Pfaelzer: Vizio has not demonstrated by clear and convincing evidence that the asserted claims in the 840 and 842 patents are insolubly ambiguous. Furthermore, the Court finds that the '840 and '842 patent claims are directed to palpable applications in the field of video signal processing. Consequently, the Court denies Vizio's motion for summary judgment of invalidity for the '840 and '842 patents. (jre) (Entered: 03/04/2013)
03/20/2013	114	Joint STIPULATION to Compel JOINT STIPULATION RE: OPLUS' MOTION TO COMPEL PRODUCTION OF DOCUMENTS filed by JOINT STIPULATION RE: OPLUS' MOTION TO COMPEL PRODUCTION OF DOCUMENTS Oplus Technologies, Ltd.. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Declaration Charles c. Koole, # 5 Exhibit A, # 6 Exhibit B, # 7 Exhibit C, # 8 Exhibit D, # 9 Exhibit E, # 10 Exhibit F, # 11 Exhibit G, # 12 Exhibit H, # 13 Exhibit I, # 14 Exhibit J, # 15 Exhibit K)(Opatken, Gabriel) (Entered: 03/20/2013)
03/28/2013	115	NOTICE OF MOTION AND MOTION for Order for PLAINTIFF'S MEMORANDUM IN SUPPORT OF ITS MOTION TO EXTEND CASE SCHEDULE filed by PLAINTIFF'S MEMORANDUM IN SUPPORT OF ITS

		MOTION TO EXTEND CASE SCHEDULE Oplus Technologies, Ltd.. Motion set for hearing on 4/29/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Proposed Order Proposed Order, # 2 Declaration Daniel R. Ferri, # 3 Exhibit A, # 4 Exhibit B, # 5 Exhibit C, # 6 Exhibit D, # 7 Exhibit E)(Opatken, Gabriel) (Entered: 03/28/2013)
03/28/2013	116	NOTICE OF MOTION re MOTION for Order for PLAINTIFF'S MEMORANDUM IN SUPPORT OF ITS MOTION TO EXTEND CASE SCHEDULE 115 filed by Plaintiff Oplus Technologies, Ltd.. Motion set for hearing on 4/29/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Opatken, Gabriel) (Entered: 03/28/2013)
04/01/2013	117	MEMORANDUM of Points and Authorities in Opposition filed by Defendant VIZIO, Inc.. *[Defendant VIZIO, Inc.'s Supplemental Memorandum in Opposition to Oplus' Motion to Compel Production of Documents]* Re: Stipulation to Compel,, 114 (Attachments: # 1 Declaration of Charles C. Koole, # 2 Exhibit A to Koole Declaration, # 3 Exhibit B to Koole Declaration, # 4 Exhibit C to Koole Declaration, # 5 Exhibit D to Koole Declaration)(Pruetz, Adrian) (Entered: 04/01/2013)
04/03/2013	118	SCHEDULING NOTICE by Judge Mariana R. Pfaelzer - Motion to Extend Case Schedule previously scheduled for 4/29/2013 at 11:00 a.m. has been taken under submission. Hearing is vacated. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY.(im) TEXT ONLY ENTRY (Entered: 04/03/2013)
04/03/2013	119	STIPULATION for Protective Order filed by STIPULATION FOR ENTRY OF A PROTECTIVE ORDER Oplus Technologies, Ltd.. (Attachments: # 1 Exhibit 1) (Opatken, Gabriel) (Entered: 04/03/2013)
04/03/2013	120	MINUTES (IN CHAMBERS) by Judge Mariana R. Pfaelzer: Oplus moves to compel this discovery and extend the case schedule 114 , 115 . The Court DENIES Oplus's motion to compel. The Court extends the close of fact discovery to 5/15/2013, i.e., a one-month extension. Court Reporter: None. (gk) Modified on 4/5/2013 (lom). (Document is STRICKEN, see document no. 122.) (Entered: 04/04/2013)
04/03/2013	121	MINUTE ORDER IN CHAMBERS Order Re ECF Nos.114, 115 by Judge Mariana R. Pfaelzer: Vizio has asked Oplus pointed questions about the level of granularity attaching to its infringement theories in its September 18, 2012, letter. (In fact, a Crtl-F word search of the September 18, 2012 letter for the "?" character reveals a handy, though partial, blueprint for amending these contentions.) Answers to these questions will provide structure to the pending discovery process. Leaving them unanswered has had the opposite effect so fat. And in the current morass of unstructured discovery caused by these inadequate infringement contentions, the patentee's instant motion to compel does not garner much sympathy. The Court therefore DENIES Oplus's motion to compel. On the issue of the fact discovery deadline, however, the Court is somewhat more sympathetic. Thus, the Court extends the close of fact discovery to May 15, 2013, i.e., a one-month extension.re: Stipulation to Compel,, [, MOTION for Order for PLAINTIFF'S MEMORANDUM IN SUPPORT OF ITS MOTION TO EXTEND CASE SCHEDULE []. (bp) (Entered: 04/05/2013)

04/05/2013	122	ORDER by Judge Mariana R. Pfaelzer: the documents listed below were improperly filed for the following reasons: Minute Order was issued in error.; therefore, the following document(s) shall be stricken from the record and shall not be considered by the Court: Order on Motion for Order, 120 . (lom) (Entered: 04/05/2013)
04/05/2013	123	STIPULATED PROTECTIVE ORDER 119 by Judge Mariana R. Pfaelzer. (See attached Order for further details). (jp) (Entered: 04/09/2013)
04/12/2013	124	APPLICATION of Christopher I. Jackson to Withdraw as Attorney filed by Defendant VIZIO, Inc.. (Attachments: # 1 Proposed Order)(Koole, Charles) (Entered: 04/12/2013)
04/15/2013	125	ORDER by Judge Mariana R. Pfaelzer that the Application to Withdraw of Christopher Jackson as Counsel for Defendant Vizio Inc 124 is GRANTED. (jp) (Entered: 04/16/2013)
05/17/2013	126	NOTICE OF MOTION AND MOTION for Order for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents filed by Defendant VIZIO, Inc.. Motion set for hearing on 6/17/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Memorandum of Points and Authorities, # 2 Proposed Order, # 3 Declaration of Adrian M. Pruetz, # 4 Declaration of Charles C. Koole ("Koole Decl."), # 5 Exhibit A to Koole Decl., # 6 Exhibit B to Koole Decl., # 7 Exhibit C to Koole Decl., # 8 Exhibit D to Koole Decl., # 9 Exhibit E to Koole Decl., # 10 Exhibit F to Koole Decl., # 11 Exhibit G to Koole Decl., # 12 Exhibit H to Koole Decl., # 13 Exhibit I to Koole Decl.)(Pruetz, Adrian) (Entered: 05/17/2013)
05/24/2013	127	OPPOSITION to MOTION for Order for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents 126 filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Declaration of Daniel Ferri, # 2 Exhibit 1 to D. Ferri Declaration, # 3 Exhibit 2 to D. Ferri Declaration, # 4 Exhibit 3 to D. Ferri Declaration, # 5 Exhibit 4 to D. Ferri Declaration, # 6 Exhibit 5 to D. Ferri Declaration, # 7 Declaration of Gabriel Opatken, # 8 Exhibit A to G. Opatken Declaration, # 9 Exhibit B to G. Opatken Declaration, # 10 Exhibit C to G. Opatken Declaration, # 11 Exhibit D to. Opatken Declaration)(Opatken, Gabriel) (Entered: 05/24/2013)
05/28/2013	128	MINUTES (IN CHAMBERS) SCHEDULING ORDER by Judge Mariana R. Pfaelzer: On 1/5/2009, J. Eve of the Northern District of Illinois issued a protective order in IP Innovation LLC, et al. v. Vizio, Inc. et al., Case No. 1:08-cv-00393 (N.D. Ill.). Ex. B to Koole Decl. Vizio has moved this Court to enforce certain confidentiality provisions from this protective order 126 . Oral argument is advanced to 6/7/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. Vizio must submit its reply brief no later than 5/31/2013. Court Reporter: None. (gk) (Entered: 05/28/2013)
05/30/2013	129	REPLY In Support of MOTION for Order for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents 126 *[Public Version]* filed by Defendant VIZIO, Inc.. (Attachments: # 1 Supplemental Declaration of Adrian M. Pruetz, # 2 Supplemental Declaration of Charles C. Koole

		("Supp. Koole Decl."), # 3 Exhibit J to Supp. Koole Decl., # 4 Exhibit K to Supp. Koole Decl., # 5 Exhibit L to Supp. Koole Decl., # 6 Exhibit M to Supp. Koole Decl., # 7 Exhibit N to Supp. Koole Decl., # 8 Exhibit O to Supp. Koole Decl., # 9 Exhibit P to Supp. Koole Decl., # 10 Exhibit Q to Supp. Koole Decl., # 11 Exhibit R to Supp. Koole Decl.)(Pruetz, Adrian) (Entered: 05/30/2013)
05/30/2013	130	NOTICE of Manual Filing filed by Defendant VIZIO, Inc. (Pruetz, Adrian) (Entered: 05/30/2013)
05/31/2013	131	APPLICATION to File Documents Under Seal in Support of Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents filed by Defendant VIZIO, Inc. (gk) (Entered: 06/03/2013)
06/03/2013	133	ORDER GRANTING DEFENDANT VIZIO INC.'S APPLICATION TO FILE DOCUMENTS UNDER SEAL IN SUPPORT OF ITS MOTION FOR PROTECTION FROM SUBPOENA ISSUED IN VIOLATION OF MULTIPLE COURT ORDERS AND PROHIBITING USE OF SUBPOENAED DOCUMENTS by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED that Defendant's Application 131 is GRANTED and the following documents be filed under seal: (1) Defendant VIZIO, Inc.'s Reply in Support of its Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents (Confidential Version). (2) Exhibit L to the Supplemental Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents, a true and correct copy of relevant excerpts ofthe "Videotaped 30(B)(6) Deposition of VIZIO, Inc. (Kenneth R. Lowe)" taken on 5/10/2013. (3) Exhibit 0 to the Supplemental Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents, a true and correct copy of relevant excerpts ofthe "Videotaped 30(B)(6) Deposition of VIZIO, Inc. (Robert Brinkman)" taken on 5/9/2013. (gk) (Entered: 06/04/2013)
06/03/2013	135	SEALED DOCUMENT- CONFIDENTIAL EXHIBITS L and O to the Supplemental Declaration of Charles C. Koole in Support of Defendant Vizio, Inc.'s Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents. (mat) (Entered: 06/07/2013)
06/03/2013	136	SEALED DOCUMENT- DEFENDANT VIZIO, INC.'S REPLY in Support of its, Inc.'s Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents.(mat) (Entered: 06/07/2013)
06/04/2013	132	SCHEDULING NOTICE by Judge Mariana R. Pfaelzer MOTION for Order for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents 126 previously scheduled for 6/7/2013 at 11:00 a.m. has been rescheduled. Motion set is now set for hearing on 6/7/2013 at 1:30 PM before Judge Mariana R. Pfaelzer. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY.(im) TEXT ONLY ENTRY (Entered: 06/04/2013)

06/07/2013	134	NOTICE OF MOTION AND MOTION for Order for To Extend Expert Report Due Dates by 30 Days filed by Plaintiff Oplus Technologies, Ltd.. Motion set for hearing on 7/8/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Memorandum, # 2 Declaration)(Gibbons, Paul) (Entered: 06/07/2013)
06/07/2013	137	MINUTES OF Motion Hearing held before Judge Mariana R. Pfaelzer: The Court takes Vizio, Inc.'s Motion for Protection from Subpoena Issued in Violation of Multiple Court Orders and Prohibiting Use of Subpoenaed Documents 126 under submission, and its order will follow. Plaintiff's Motion for Order to Extend Expert Report Due Dates 134 is taken under submission. Opposition is due by 6/10/2013. Plaintiff shall file the Amended Contentions Infringement by 6/14/2013. Court Reporter: Kathy Stride. (gk) (Entered: 06/10/2013)
06/10/2013	138	OPPOSITION re: MOTION for Order for To Extend Expert Report Due Dates by 30 Days 134 filed by Defendant VIZIO, Inc.. (Pruetz, Adrian) (Entered: 06/10/2013)
06/14/2013	139	NOTICE Notice of Amended Infringement Contentions filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Gibbons, Paul) (Entered: 06/14/2013)
06/21/2013	140	SCHEDULING NOTICE by Judge Mariana R. Pfaelzer - Telephone Conference set for 6/25/2013 at 1:30 PM before Judge Mariana R. Pfaelzer re expert report deadlines and amended infringement contentions. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY. (im) TEXT ONLY ENTRY (Entered: 06/21/2013)
06/24/2013	141	STATUS REPORT *in Advance of June 25, 2013 Telephone Conference with the Court re Expert Report Deadlines and Amended Infringement Contentions* filed by Defendant VIZIO, Inc.. (Pruetz, Adrian) (Entered: 06/24/2013)
06/25/2013	144	MINUTES OF Telephonic Status Conference held before Judge Mariana R. Pfaelzer: Court hears from counsel. Court notes that counsel have exchanged expert reports regarding infringement and invalidity. Court informs counsel for Plaintiff Oplus Technologies, Ltd. of adequacy of amended infringement contentions submitted on 6/14/2013. The parties are free to file motions of any kind. Court Reporter: Lisa Gonzalez. (gk) (Entered: 06/27/2013)
06/26/2013	142	TRANSCRIPT ORDER as to Plaintiff Oplus Technologies, Ltd. Court Reporter. Court will contact Gabriel Optaken at goptaken@nshn.com with any questions regarding this order. Transcript portion requested: Other: 06/07/2013. Transcript preparation will not begin until payment has been satisfied with the court reporter/recorder. (Opatken, Gabriel) (Entered: 06/26/2013)
06/27/2013	143	TRANSCRIPT ORDER as to Plaintiff Oplus Technologies, Ltd. Court Reporter. Court will contact Gabriel I. Opatken at gopatken@nshn.com with any questions regarding this order. Transcript portion requested: Other: 06/25/2013. Transcript preparation will not begin until payment has been satisfied with the court reporter/recorder. (Opatken, Gabriel) (Entered: 06/27/2013)

07/01/2013	145	TRANSCRIPT for proceedings held on 6/25/13 1:30 p.m.. Court Reporter: LISA M. GONZALEZ, CSR, CCRR, phone number (213) 894-2826. Transcript may be viewed at the court public terminal or purchased through the Court Reporter/Electronic Court Recorder before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER. Notice of Intent to Redact due within 7 days of this date. Redaction Request due 7/22/2013. Redacted Transcript Deadline set for 8/1/2013. Release of Transcript Restriction set for 9/29/2013. (ha) (Entered: 07/01/2013)
07/01/2013	146	NOTICE OF FILING TRANSCRIPT filed for proceedings 6/25/13 1:30 p.m. re Transcript 145 THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY.(ha) TEXT ONLY ENTRY (Entered: 07/01/2013)
07/02/2013	147	SCHEDULING NOTICE by Judge Mariana R. Pfaelzer - Plaintiff's motion to extend expert report 134 previously scheduled for 7/8/2013 at 11:00 a.m. has been vacated. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY.(im) TEXT ONLY ENTRY (Entered: 07/02/2013)
07/29/2013	148	NOTICE OF MOTION AND MOTION for Summary Judgment as to Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 filed by Defendant VIZIO, Inc.. Motion set for hearing on 9/9/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Memorandum of Points and Authorities in Support of Motion for Summary Judgment of Noninfringement, # 2 Statement of Uncontroverted Facts and Conclusions of Law, # 3 Declaration of Charles C. Koole in Support of Motion for Summary Judgment of Noninfringement, # 4 Exhibit 1 to Koole Declaration, # 5 Exhibit 2 to Koole Declaration, # 6 Exhibit 3 to Koole Declaration, # 7 Exhibit 4 to Koole Declaration, # 8 Exhibit 5 to Koole Declaration, # 9 Exhibit 6 to Koole Declaration, # 10 Exhibit 7 to Koole Declaration, # 11 Exhibit 8 to Koole Declaration, # 12 Exhibit 9 to Koole Declaration, # 13 Exhibit 10 to Koole Declaration, # 14 Exhibit 11 to Koole Declaration, # 15 Exhibit 12 to Koole Declaration, # 16 Exhibit 13 to Koole Declaration, # 17 Exhibit 14 to Koole Declaration, # 18 Exhibit 15 to Koole Declaration, # 19 Exhibit 16 to Koole Declaration, # 20 Exhibit 17 to Koole Declaration, # 21 Exhibit 18 to Koole Declaration, # 22 Exhibit 19 to Koole Declaration, # 23 Exhibit 20 to Koole Declaration, # 24 Declaration of Dr. Sheila S. Hemami in Support of Motions for Summary Judgment of Noninfringement and Invalidity, # 25 Exhibit A to Hemami Declaration, # 26 Exhibit B to Hemami Declaration, # 27 Proposed Judgment Granting Motion for Summary Judgment of Noninfringement)(Pruetz, Adrian) (Entered: 07/29/2013)
07/29/2013	149	NOTICE of Manual Filing filed by Defendant VIZIO, Inc. (Pruetz, Adrian) (Entered: 07/29/2013)
07/29/2013	150	NOTICE OF MOTION AND MOTION for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 filed by Defendant VIZIO, Inc.. Motion set for hearing on 9/9/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Memorandum of Points and Authorities in support of VIZIO's

		Motion for Summary Judgment of Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840, # 2 Statement of Uncontroverted Facts and Conclusions of Law, # 3 Declaration of Charles C. Koole ("Koole Decl."), # 4 Exhibit 1 to Koole Decl., # 5 Exhibit 2 to Koole Decl., # 6 Exhibit 3 to Koole Decl., # 7 Exhibit 4 to Koole Decl., # 8 Exhibit 5 to Koole Decl., # 9 Exhibit 6 to Koole Decl., # 10 Exhibit 7 to Koole Decl., # 11 Exhibit 8 to Koole Decl., # 12 Declaration of Dr. Sheila S. Hemami ("Hemami Decl."), # 13 Exhibit A to Hemami Decl., # 14 Exhibit B to Hemami Decl., # 15 Proposed Judgment of Invalidity of U.S. Patent No. 6,239,842 under 35 U.S.C. 102 and U.S. Patent No. 7,271,840 under 35 U.S.C. 112)(Pruetz, Adrian) (Entered: 07/29/2013)
07/30/2013	151	APPLICATION to File Documents Under Seal in Support of its Motion for Summary Judgment of Non-Infringement of U.S. Patent Nos. 6,239,842 and 7,271,840 filed by Defendant VIZIO, Inc. Lodged Proposed Order and Three Envelopes. (gk) (Entered: 07/31/2013)
07/31/2013	152	ORDER GRANTING DEFENDANT VIZIO INC.'S APPLICATION TO FILE DOCUMENTS UNDER SEAL IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT OF NONINFRINGEMENT OF U.S. PATENT NOS. 6,239,842 AND 7,271,840 by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED that Defendant Vizio Inc.'s Application 151 is GRANTED and the following documents be filed under seal: (1) Defendant VIZIO, Inc.'s Memorandum of Points and Authorities in Support of its Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,329842 and 7,271,840 (Confidential Version). (2) Exhibit 4 to the Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,329842 and 7,271,840, a true and correct copy of relevant excerpts of the "Videotaped 30(B)(6) Deposition of VIZIO, Inc. (Robert Brinkman)" taken on 5/9/2013. (3) Exhibit 5 to the Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,329842 and 7,271,840, a true and correct copy of relevant excerpts of the "Videotaped 30(B)(6) Deposition of VIZIO, Inc. (Kenneth R. Lowe)" taken on 5/10/2013. (4) Exhibit B1 to the Declaration of Dr. Sheila S. Hemami in Support of Defendant VIZIO, Inc.'s Motions for Summary Judgment of Noninfringement and Invalidity. (gk) (Entered: 08/05/2013)
07/31/2013	153	SEALED DOCUMENT - MEMORANDUM of Points and Authorities in Support of Defendant Vizio, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,329,842 and 7,271.840. (gk) (Entered: 08/05/2013)
07/31/2013	154	SEALED DOCUMENT - CONFIDENTIAL EXHIBITS 4 and 5 to the Declaration of Charles C. Koole in Support of Defendant Vizio, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840. (gk) (Entered: 08/05/2013)
07/31/2013	155	SEALED DOCUMENT - CONFIDENTIAL EXHIBIT B1 to the Declaration of Sheila S. Hemami in Support of Vizio, Inc.'s Motions for Summary Judgment of Noninfringement and Invalidity. (gk) (Entered: 08/05/2013)

08/16/2013	156	NOTICE OF MOTION AND MOTION to Compel *JOINT STIPULATION RE: OPLUS' MOTION TO COMPEL DISCOVERY* filed by PLAINTIFF Oplus Technologies, Ltd.. Motion set for hearing on 9/9/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Declaration Gabriel I. Opatken, # 2 Exhibit A, # 3 Exhibit B, # 4 Exhibit C, # 5 Exhibit D, # 6 Exhibit E, # 7 Exhibit F, # 8 Exhibit G, # 9 Exhibit H, # 10 Declaration Charles C. Koole, # 11 Exhibit 1, # 12 Exhibit 2, # 13 Exhibit 3, # 14 Exhibit 4, # 15 Exhibit 5, # 16 Exhibit 6, # 17 Exhibit 7, # 18 Exhibit 8, # 19 Exhibit 9, # 20 Exhibit 10, # 21 Exhibit 11, # 22 Exhibit 12, # 23 Exhibit 13, # 24 Exhibit 14, # 25 Exhibit 15, # 26 Exhibit 16, # 27 Exhibit 17)(Opatken, Gabriel) (Entered: 08/16/2013)
08/16/2013	157	NOTICE OF MOTION re MOTION to Compel *JOINT STIPULATION RE: OPLUS' MOTION TO COMPEL DISCOVERY* 156 filed by Plaintiff Oplus Technologies, Ltd.. Motion set for hearing on 9/9/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Opatken, Gabriel) (Entered: 08/16/2013)
08/16/2013	158	NOTICE of Manual Filing filed by Defendant VIZIO, Inc. of Confidential Exhibits Under Seal. (Pruetz, Adrian) (Entered: 08/16/2013)
08/19/2013	159	OPPOSITION to MOTION for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 150 *Oplus' Response to Vizio, Inc.'s Motion For Summary Judgment of Invalidity* filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Rsp Stmt of Facts, # 2 Declaration of Daniel Ferri, # 3 Exhibit 1, # 4 Exhibit 2, # 5 Exhibit 3, # 6 Exhibit 4, # 7 Exhibit 5, # 8 Exhibit 6, # 9 Exhibit 7, # 10 Exhibit 8, # 11 Exhibit 9)(Gasey, Arthur) (Entered: 08/19/2013)
08/19/2013	160	OPPOSITION to MOTION for Summary Judgment as to Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 148 filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Plaintiff's Undisputed Facts, # 2 Declaration Declaration of Daniel R. Ferri, # 3 Exhibit A, # 4 Exhibit B, # 5 Exhibit C, # 6 Exhibit D, # 7 Exhibit E, # 8 Exhibit F, # 9 Exhibit G, # 10 Exhibit H, # 11 Exhibit J, # 12 Exhibit K, # 13 Exhibit L, # 14 Exhibit M, # 15 Exhibit N, # 16 Exhibit O, # 17 Exhibit P, # 18 Exhibit Q, # 19 Exhibit T, # 20 Exhibit U, # 21 Exhibit V, # 22 Exhibit W, # 23 Exhibit X, # 24 Plaintiffs Statement of Genuine Disputes of Material Fact)(Gasey, Arthur) (Entered: 08/19/2013)
08/19/2013	161	NOTICE of Manual Filing filed by Plaintiff Oplus Technologies, Ltd. of Sealed Brief, Statements of Fact, and Accompanying Exhibits. (Attachments: # 1 Attachment A) (Gasey, Arthur) (Entered: 08/19/2013)
08/19/2013	162	APPLICATION to File Documents Under Seal in Support of Its Opposition to Oplus' Motion to Compel Discovery filed by Defendant VIZIO, Inc. Lodged Proposed Order. (gk) (Entered: 08/21/2013)
08/19/2013	163	ORDER GRANTING DEFENDANT VIZIO INC.'S APPLICATION TO FILE DOCUMENTS UNDER SEAL IN SUPPORT OF ITS OPPOSITION TO OPLUS' MOTION TO COMPEL DISCOVERY by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED that Defendant's Application 162 is GRANTED and the following documents be filed under seal: (1) Exhibit 4 to the Declaration of Charles C.

		Koole in Support of Defendant VIZIO, Inc.'s Opposition to Oplus' Motion to Compel, true and correct copies of product specification sheets which were produced to Oplus on 7/12/2013. (2) Exhibit 7 to the Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Opposition to Oplus' Motion to Compel, a true and correct copy of relevant excerpts of the Deposition of VIZIO, Inc. (Kenneth Roy Lowe) from 5/10/2013. (3) Exhibit 8 to the Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Opposition to Oplus' Motion to Compel, a true and correct copy of relevant excerpts of the Deposition of VIZIO, Inc. (Robert Brinkman) from 5/9/2013. (4) Exhibit 17 to the Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Opposition to Oplus' Motion to Compel, a true and correct copy of relevant excerpts of the Deposition of Jesse L. Rice, from 5/15/2013. (gk) (Entered: 08/21/2013)
08/19/2013	164	SEALED DOCUMENT - CONFIDENTIAL EXHIBITS 4, 7, 8, and 17 to the Declaration of Charles C. Koole in Support of Defendant Vizio, Inc.'s Opposition to Oplus' Motion to Compel. (gk) (Entered: 08/21/2013)
08/20/2013	165	APPLICATION to File Documents Under Seal in Support of Response to Vizio, Inc.'s Motion for Summary Judgment of Non-Infringement filed by Plaintiff Oplus Technologies, Ltd. Lodged Proposed Order. (gk) (Entered: 08/22/2013)
08/21/2013	166	ORDER GRANTING OPLUS TECHNOLOGIES, LTD. APPLICATION TO FILE DOCUMENTS UNDER SEAL IN SUPPORT OF ITS RESPONSE TO VIZIO, INC.'S MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT by Judge Mariana R. Pfaelzer: Plaintiff's Application to file confidential portions of Plaintiff Oplus' Response To Vizo, Inc.'s Motion For Summary Judgment Of Noninfringement and Exhibits I, R and S to the Declaration of Daniel R. Ferri in Support of Oplus' Response to Vizio, Inc.'s Motion For Summary Judgment Of Non-Infringement 165 is GRANTED. See Order for documents to be filed under seal. (gk) (Entered: 08/22/2013)
08/21/2013	171	SEALED DOCUMENT - Oplus' Response to Vizio, Inc.'s Motion for Summary Judgment of Noninfringement. (gk) (Entered: 08/27/2013)
08/21/2013	172	SEALED DOCUMENT - Oplus' Response to Statement of Uncontroverted Facts and Conclusions of Law re Vizio's Motion for Summary Judgment of Noninfringement. (gk) (Entered: 08/27/2013)
08/21/2013	173	SEALED DOCUMENT - Plaintiff's Statement of Genuine Disputes of Material Fact. (gk) (Entered: 08/27/2013)
08/21/2013	174	SEALED DOCUMENT - Exhibit I in Support of Declaration of Daniel R. Ferri in Support of Oplus' Response to Vizio, Inc.'s Motion for Summary Judgment of Noninfringement. (gk) Modified on 8/27/2013 (gk). (Entered: 08/27/2013)
08/21/2013	175	SEALED DOCUMENT - Exhibit R in Support of Declaration of Daniel R. Ferri in Support of Oplus' Response to Vizio, Inc.'s Motion for Summary Judgment of Noninfringement. (Attachments: # 1 Part 2)(gk) (Entered: 08/27/2013)

08/21/2013	176	SEALED DOCUMENT - Exhibit S in Support of Declaration of Daniel R. Ferri in Support of Oplus' Response to Vizio, Inc.'s Motion for Summary Judgment of Noninfringement. (gk) (Entered: 08/27/2013)
08/26/2013	167	REPLY in support of MOTION for Summary Judgment as to Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 150 filed by Defendant VIZIO, Inc.. (Attachments: # 1 VIZIO's Reply to Oplus' Response to VIZIO's Statement of Uncontroverted Facts, # 2 Supplemental Declaration of Charles Koole in support of VIZIO's Motion for Summary Judgment of Invalidity ("Supp. Koole Decl."), # 3 Exhibit 9 to Supp. Koole Decl., # 4 Exhibit 10 to Supp. Koole Decl., # 5 Exhibit 11 to Supp. Koole Decl., # 6 Exhibit 12 to Supp. Koole Decl., # 7 Exhibit 13 to Supp. Koole Decl.)(Pruetz, Adrian) (Entered: 08/26/2013)
08/26/2013	168	REPLY in support of MOTION for Summary Judgment as to Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 148 filed by Defendant VIZIO, Inc.. (Attachments: # 1 VIZIO's Response to Oplus' Statement of Alleged Genuine Disputes of Material Fact, # 2 VIZIO's Reply to Oplus' Response to VIZIO's Statement of Uncontroverted Facts (Public Version), # 3 VIZIO's Evidentiary Objections and Request to Strike the Declaration of Daniel R. Ferri, # 4 Supplemental Declaration of Charles Koole in support of VIZIO's Motion for Summary Judgment of Noninfringement ("Supp. Koole Decl."), # 5 Exhibit 21 to Supp. Koole Decl., # 6 Exhibit 22 to Supp. Koole Decl., # 7 Exhibit 23 to Supp. Koole Decl., # 8 Exhibit 24 to Supp. Koole Decl., # 9 Exhibit 25 to Supp. Koole Decl., # 10 Exhibit 26 to Supp. Koole Decl., # 11 Exhibit 27 to Supp. Koole Decl., # 12 Exhibit 28 to Supp. Koole Decl., # 13 Exhibit 29 to Supp. Koole Decl., # 14 Exhibit 30 to Supp. Koole Decl., # 15 Exhibit 31 to Supp. Koole Decl.)(Pruetz, Adrian) (Entered: 08/26/2013)
08/26/2013	169	NOTICE of Manual Filing filed by Defendant VIZIO, Inc. of Confidential Documents Under Seal. (Pruetz, Adrian) (Entered: 08/26/2013)
08/26/2013	170	MEMORANDUM of Points and Authorities in Opposition filed by Defendant VIZIO, Inc.. *[Defendant VIZIO, Inc.'s Supplemental Memorandum in Opposition to Oplus' Motion to Compel Discovery]* Re: MOTION to Compel *JOINT STIPULATION RE: OPLUS' MOTION TO COMPEL DISCOVERY* 156 (Attachments: # 1 Supplemental Declaration of Charles Koole in support of VIZIO's Opposition to Oplus' Motion to Compel ("Supp. Koole Decl."), # 2 Exhibit 17 to Supp. Koole Decl., # 3 Exhibit 18 to Supp. Koole Decl., # 4 Exhibit 19 to Supp. Koole Decl., # 5 Exhibit 20 to Supp. Koole Decl.)(Pruetz, Adrian) (Entered: 08/26/2013)
08/27/2013	177	APPLICATION to File Documents Under Seal in Support of Reply in Support of Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 filed by Defendant VIZIO, Inc. Lodged Proposed Order. (gk) (Entered: 09/03/2013)
08/29/2013	178	ORDER GRANTING DEFENDANT VIZIO INC.'S APPLICATION TO FILE DOCUMENTS UNDER SEAL IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT OF NONINFRINGEMENT OF U.S. PATENT NOS. 6,239,842 AND 7,271,840 by Judge Mariana R. Pfaelzer: Defendant's Application 177 is

		GRANTED and the following documents be filed under seal: (1) Defendant VIZIO, Inc.'s Reply to Oplus Technologies, Ltd.'s Response to VIZIO's Statement of Uncontroverted Facts (Confidential Version). (2) Exhibit 22 to the Supplemental Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,329,842 and 7,271,840, a true and correct copy of relevant excerpts of the "Videotaped 30(B)(6) Deposition of VIZIO, Inc. (Kenneth R. Lowe)" taken on 5/10/2013. (3) Exhibit 23 to the Supplemental Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,329,842 and 7,271,840, a true and correct copy of relevant excerpts of the "Videotaped 30(B)(6) Deposition of VIZIO, Inc. (Robert Brinkman)" taken on 5/9/2013. (gk) (Entered: 09/03/2013)
08/29/2013	180	SEALED DOCUMENT - CONFIDENTIAL EXHIBITS 22 and 23 to the Supplemental Declaration of Charles C. Koole in Support of Defendant Vizio, Inc.'s Motion for Summary Judgment of Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840. (gk) (Entered: 09/05/2013)
08/29/2013	181	SEALED DOCUMENT - DEFENDANT VIZIO, INC.'S REPLY to Oplus Technologies, Ltd.'s Response to Vizio's Statement of Uncontroverted Facts. (gk) (Entered: 09/05/2013)
09/04/2013	179	SCHEDULING NOTICE by Judge Mariana R. Pfaelzer: MOTIONS 150 148 156 previously scheduled for 9/9/13 at 11:00 a.m. have been rescheduled. Motions now set for hearing on 9/9/2013 at 1:30 PM. THERE IS NO PDF DOCUMENT ASSOCIATED WITH THIS ENTRY. (im) TEXT ONLY ENTRY (Entered: 09/04/2013)
09/09/2013	182	MINUTES OF DEFENDANT VIZIO, INC.'S MOTION FOR SUMMARY JUDGMENT OF NONINFRINGEMENT OF U.S. PATENTS 6,239,842 AND 7,271,840 (fld 7/29/13; doc.#148)2. DEFENDANT VIZIO, INC'S MOTION FOR SUMMARY JUDGMENT OF INVALIDITY OF U.S. PATENT NOS. 6,239,842 AND 7,271,840 (fld 7/29/13; doc#150) PLAINTIFF'S MOTION TO COMPEL DISCOVERY (fid 8/16/13; doc#156) held before Judge Mariana R. Pfaelzer: The case is called and appearances are made. Court hears oral argument. The Court takes the motions under submission, and its order will follow.Court Reporter: Rosalyn Adams. (bp) (Entered: 09/16/2013)
10/02/2013	183	ORDER GRANTING IN PART AND DENYING IN PART DEFENDANT VIZIO, INC.'S MOTION FOR SUMMARY JUDGMENT OF INVALIDITY, GRANTING DEFENDANT VIZIO'S MOTION FOR SUMMARY JUDGMENT OF NONINFRINGEMENT, AND DENYING PLAINTIFF OPLUS TECHNOLOGIES, LTD.'S MOTION TO COMPEL by Judge Mariana R. Pfaelzer: The Court GRANTS Vizio's Motion for Summary Judgment of Noninfringement 148 and GRANTS Vizio's Motion for Invalidity of the '842 Patent 150 , both with prejudice. Further, the Court DENIES Vizio's Motion for Invalidity of the '840 Patent 150 , and DENIES Oplus's Motion to Compel Discovery 156 . (gk) (Entered: 10/03/2013)

10/16/2013	184	NOTICE OF LODGING filed re Order on Motion for Summary Judgment,, Order on Motion to Compel,,,,,, 183 (Attachments: # 1 [Proposed] Judgment in Favor of VIZIO, Inc. of Noninfringement of U.S. Patent Nos. 6,239,842 and 7,271,840 and Invalidity of U.S. Patent No. 6,239,842)(Pruetz, Adrian) (Entered: 10/16/2013)
10/17/2013	185	JUDGMENT IN FAVOR OF VIZIO, INC. OF NONINFRINGEMENT OF U.S. PATENT NOS. 6,239,842 AND 7,271,840 AND INVALIDITY OF U.S. PATENT NO. 6,239,842 by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED, ADJUDGED, AND DECREED THAT: (1) Judgment is entered in favor of Defendant VIZIO, Inc. ("VIZIO") and against Plaintiff Oplus Technologies, Ltd. ("Oplus"), with prejudice, on each of the following grounds: (a) U.S. Patent No. 6,239,842 ("the '842 Patent") is invalid as anticipated by the prior art under 35 U.S.C. Section 102(b). (b) The '842 Patent is not infringed by VIZIO directly or indirectly under 35 U.S.C. Sections 271(a), (b) or (c). (c) U.S. Patent No. 7,271,840 ("the '840 Patent") is not infringed by VIZIO directly or indirectly under 35 U.S.C. Sections 271(a), (b) or (c). (2) Pursuant to Federal Rule of Civil Procedure 54(d)(1) and Local Rules 54-2 and 54-3, Defendant VIZIO is entitled to recover its costs incurred in this action. (3) Any request by Defendant VIZIO for an award of attorneys' fees and related nontaxable expenses under Federal Rule of Civil Procedure 54(d)(2) shall be made pursuant to Local Rule 54-10. (MD JS-6, Case Terminated). (gk) (Entered: 10/18/2013)
10/18/2013	186	REPORT ON THE DETERMINATION OF AN ACTION Regarding a Patent or Trademark. (Closing) (Attachments: # 1 Judgment) (gk) (Entered: 10/18/2013)
10/25/2013	187	NOTICE OF MOTION AND MOTION of Paul C. Gibbons to Withdraw as Attorney filed by Plaintiff Oplus Technologies, Ltd.. (Gibbons, Paul) (Entered: 10/25/2013)
10/30/2013	188	TRANSCRIPT ORDER as to Plaintiff Oplus Technologies, Ltd. Court Reporter. Court will contact Arthur A. Gasey at gasey@nshn.com with any questions regarding this order. Transcript portion requested: Other: Summary Judgment Hearing 9/9/13. Transcript preparation will not begin until payment has been satisfied with the court reporter/recorder. (Gasey, Arthur) (Entered: 10/30/2013)
10/31/2013	189	NOTICE of Manual Filing filed by Defendant VIZIO, Inc. (Pruetz, Adrian) (Entered: 10/31/2013)
10/31/2013	190	NOTICE OF MOTION AND MOTION for Attorney Fees *and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power* filed by Defendant VIZIO, Inc.. Motion set for hearing on 12/2/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (Attachments: # 1 Memorandum of Points and Authorities in Support of Defendant VIZIO, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power, # 2 Proposed Order)(Pruetz, Adrian) (Entered: 10/31/2013)
10/31/2013	191	APPLICATION to the Clerk to Tax Costs against Plaintiff Oplus Technologies, Ltd. re: Judgment,,,, 185 , filed by Defendant VIZIO, Inc.. Application set for hearing on 11/14/2013 at 01:00 PM before Clerk of Court. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Koole, Charles) (Entered: 10/31/2013)

10/31/2013	193	APPLICATION to File Documents Under Seal in Support of Its Motion for Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power filed by Defendant VIZIO, Inc. (gk) (Entered: 11/01/2013)
11/01/2013	192	STIPULATION for Hearing re MOTION for Attorney Fees *and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power* 190 filed by PLAINTIFF Oplus Technologies, Ltd.. (Attachments: # 1 Proposed Order)(Szpondowski, Kara) (Entered: 11/01/2013)
11/01/2013	194	ORDER GRANTING DEFENDANT VIZIO INC.'S APPLICATION TO FILE DOCUMENTS UNDER SEAL IN SUPPORT OF ITS MOTION FOR ATTORNEYS' FEES AND EXPERT WITNESS FEES PURSUANT TO 35 U.S.C. SECTION 285, 28 U.S.C. SECTION 1927, AND THE COURT'S INHERENT POWER by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED that Defendant's Application 193 is GRANTED and the following documents be filed under seal: (1) Defendant VIZIO, Inc.'s Memorandum of Points and Authorities in Support of its Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (2) Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (gk) (Entered: 11/01/2013)
11/01/2013	195	SEALED DOCUMENT - MEMORANDUM of Points and Authorities in Support of Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (Attachments: # 1 Part 2)(gk) (Entered: 11/04/2013)
11/01/2013	196	SEALED DOCUMENT - DECLARATION of Charles C. Koole in Support of Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (Attachments: # 1 Part 2, # 2 Part 3, # 3 Part 4, # 4 Part 5, # 5 Part 6, # 6 Part 7, # 7 Part 8, # 8 Part 9, # 9 Part 10, # 10 Part 11, # 11 Part 12, # 12 Part 13, # 13 Part 14, # 14 Part 15) (gk) (Entered: 11/04/2013)
11/04/2013	197	ORDER by Judge Mariana R. Pfaelzer: Upon Stipulation 192 , the hearing on Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power 190 is continued to 12/9/2013 at 11:00 AM before Judge Mariana R. Pfaelzer. (gk) (Entered: 11/05/2013)
11/07/2013	198	OBJECTIONS to APPLICATION to the Clerk to Tax Costs against Plaintiff Oplus Technologies, Ltd. re: Judgment,,,, 185 , 191 filed by Plaintiff Oplus Technologies, Ltd.. (Ferri, Daniel) (Entered: 11/07/2013)
11/08/2013	199	REPLY filed by Defendant VIZIO, Inc. to Objections - non-motion 198 *[Defendant VIZIO, Inc.'s Reply to Plaintiff Oplus Technologies, Ltd.'s Objections to Proposed Bill of Costs]* (Pruetz, Adrian) (Entered: 11/08/2013)

11/15/2013	200	NOTICE OF APPEAL to the Federal Circuit filed by Plaintiff Oplus Technologies, Ltd.. Appeal of Judgment,,,, 185 (Appeal fee of $455 receipt number 0973-12990265 paid.) (Kneafsey, Sean) (Entered: 11/15/2013)
11/18/2013	201	NOTICE of Manual Filing filed by Plaintiff Oplus Technologies, Ltd. of Plaintiff's Opposition to Motion For Attorneys' Fees; Exhibits L and X to Declaration of Daniel R. Ferri; Plaintiff's Application To File Documents Under Seal and Proposed Order. (Ferri, Daniel) (Entered: 11/18/2013)
11/18/2013	202	Plaintiff's Opposition To Vizio's Motion For Attorneys' Fees And Expert Witness Fees Pursuant To 35 U.S.C. Sec. 285, 28 U.S.C. Sec. 1927, And The Court's Inherent Power Opposition re: MOTION for Attorney Fees *and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power* 190 filed by Plaintiff Oplus Technologies, Ltd.. (Ferri, Daniel) (Entered: 11/18/2013)
11/18/2013	203	DECLARATION of Daniel R. Ferri in opposition MOTION for Attorney Fees *and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power* 190 filed by Plaintiff Oplus Technologies, Ltd.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C Part 1, # 4 Exhibit C Part 2, # 5 Exhibit C Part 3, # 6 Exhibit C Part 4, # 7 Exhibit C Part 5, # 8 Exhibit C Part 6, # 9 Exhibit C Part 7, # 10 Exhibit D, # 11 Exhibit E, # 12 Exhibit F, # 13 Exhibit G, # 14 Exhibit H, # 15 Exhibit I, # 16 Exhibit J, # 17 Exhibit K, # 18 Exhibit L, # 19 Exhibit M, # 20 Exhibit N, # 21 Exhibit O, # 22 Exhibit P, # 23 Exhibit Q, # 24 Exhibit R, # 25 Exhibit S, # 26 Exhibit T, # 27 Exhibit U, # 28 Exhibit V, # 29 Exhibit W, # 30 Exhibit X, # 31 Exhibit Y, # 32 Exhibit Z, # 33 Exhibit AA, # 34 Exhibit AB, # 35 Exhibit AC, # 36 Exhibit AD, # 37 Exhibit AE, # 38 Exhibit AF, # 39 Exhibit AG, # 40 Exhibit AH, # 41 Exhibit AI, # 42 Exhibit AJ, # 43 Exhibit AK, # 44 Exhibit AL, # 45 Exhibit AM, # 46 Exhibit AN, # 47 Exhibit AO, # 48 Exhibit AP, # 49 Exhibit AQ, # 50 Exhibit AR)(Ferri, Daniel) (Entered: 11/18/2013)
11/18/2013	204	APPLICATION to File Documents Under Seal filed by Plaintiff Oplus Technologies, Ltd. (gk) (Entered: 11/22/2013)
11/20/2013		TRANSMISSION of the Notice of Appeal, Docket Sheet, Judgment and or order e-mailed to the US Court of Appeals for the Federal Circuit re: Notice of Appeal to Federal Circuit Court of Appeals 200 (car) (Entered: 11/20/2013)
11/21/2013	205	ORDER GRANTING PLAINTIFF OPLUS TECHNOLOGIES, LTD.'S APPLICATION TO FILE DOCUMENTS UNDER SEAL by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED that Plaintiff's Application 204 is GRANTED and the following documents be filed under seal: (1) Plaintiff Oplus Technologies, Ltd.'s Opposition to VIZIO's Motion for Attorneys' Fees and Expert Witness Fees Pursuant To 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power [Confidential Version]. (2) Exhibits L and X to the Declaration of Daniel R. Ferri in Support of Plaintiff Oplus Technologies, Ltd.'s Opposition to VIZIO's Motion For Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (gk) (Entered: 11/22/2013)

11/21/2013	206	SEALED DOCUMENT - PLAINTIFF'S OPPOSITION to Vizio's Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (gk) (Entered: 11/22/2013)
11/21/2013	207	SEALED DOCUMENT - EXHIBITS L and X to Declaration of Daniel R. Ferri in Support of Plaintiff's Opposition to Vizio's Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (gk) (Entered: 11/22/2013)
11/22/2013	208	NOTICE OF APPEAL to the Federal Circuit filed by Defendant VIZIO, Inc..(Appeal fee of $455 receipt number 0973-13026749 paid.) (Attachments: # 1 Exhibit A, # 2 Exhibit B)(Pruetz, Adrian) (Entered: 11/22/2013)
11/25/2013		TRANSMISSION of the Notice of Appeal, Docket Sheet, Judgment and or order e-mailed to the US Court of Appeals for the Federal Circuit re: Notice of Appeal to Federal Circuit Court of Appeals 208 . (dmap) (Entered: 11/25/2013)
11/25/2013	209	NOTICE of Manual Filing filed by Defendant VIZIO, Inc. of Confidential Exhibit Under Seal. (Pruetz, Adrian) (Entered: 11/25/2013)
11/25/2013	210	Amended NOTICE of Manual Filing filed by Defendant VIZIO, Inc. (Pruetz, Adrian) (Entered: 11/25/2013)
11/25/2013	211	REPLY in support of MOTION for Attorney Fees *and Expert Witness Fees Pursuant to 35 U.S.C. 285, 28 U.S.C. 1927, and the Court's Inherent Power* 190 filed by Defendant VIZIO, Inc.. (Attachments: # 1 VIZIO's Evidentiary Objections and Request to Strike the Declaration of Daniel R. Ferri, # 2 Supplemental Declaration of Charles C. Koole ("Supp. Koole Decl."), # 3 Exhibit AY to Supp. Koole Decl., # 4 Exhibit AZ to Supp. Koole Decl., # 5 Exhibit BA to Supp. Koole Decl., # 6 Exhibit BB to Supp. Koole Decl., # 7 Exhibit BC to Supp. Koole Decl., # 8 Exhibit BD to Supp. Koole Decl., # 9 Exhibit BE to Supp. Koole Decl., # 10 Exhibit BF to Supp. Koole Decl., # 11 Exhibit BG to Supp. Koole Decl., # 12 Exhibit BH to Supp. Koole Decl.) (Pruetz, Adrian) (Entered: 11/25/2013)
11/25/2013	212	APPLICATION to File Document Under Seal in Support of Its Reply in Support of Its Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power filed by Defendant VIZIO, Inc. (gk) (Entered: 12/02/2013)
11/26/2013	215	NOTIFICATION by Circuit Court of Appellate Docket Number 14-1119 from the Federal Circuit Court regarding Notice of Appeal to Federal Circuit Court of Appeals 200 as to Plaintiff Oplus Technologies, Ltd.. (dmap) (Entered: 12/05/2013)
11/27/2013	213	ORDER GRANTING DEFENDANT VIZIO INC.'S APPLICATION TO FILE DOCUMENT UNDER SEAL IN SUPPORT OF ITS REPLY IN SUPPORT OF ITS MOTION FOR ATTORNEYS' FEES AND EXPERT WITNESS FEES PURSUANT TO 35 U.S.C. SECTION 285, 28 U.S.C. SECTION 1927, AND THE COURT'S INHERENT POWER by Judge Mariana R. Pfaelzer: IT IS HEREBY ORDERED that Defendant's Application 212 is GRANTED and the following

		document be filed under seal: Confidential Exhibit BG to the Supplemental Declaration of Charles C. Koole in Support of Defendant VIZIO, Inc.'s Reply in Support of its Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (gk) (Entered: 12/02/2013)
11/27/2013	214	SEALED DOCUMENT - CONFIDENTIAL EXHIBIT BG to the Supplemental Declaration of Charles C. Koole in Support of Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285, 28 U.S.C. Section 1927, and the Court's Inherent Power. (gk) (Entered: 12/03/2013)
12/03/2013	217	NOTIFICATION by Circuit Court of Appellate Docket Number 14-1131, Federal Circuit Court regarding Notice of Appeal to Federal Circuit Court of Appeals 208 as to Defendant VIZIO, Inc. (dmap) (Entered: 12/09/2013)
12/05/2013	216	REPLY *Oplus' Responses to Vizio's Evidentiary Objections Regarding Vizio Inc.'s Motion For Attorneys' Fees And Expert Witness Fees* filed by Plaintiff Oplus Technologies, Ltd.. (Ferri, Daniel) (Entered: 12/05/2013)
12/09/2013	219	MINUTES OF Motion Hearing held before Judge Mariana R. Pfaelzer: Court hears oral argument. The Court takes Defendant Vizio, Inc.'s Motion for Attorneys' Fees and Expert Witness Fees Pursuant to 35 U.S.C. Section 285,28 U.S.C. Section 1927, and the Court's Inherent Power 190 under submission, and its order will follow. Court Reporter: Lisa Gonzalez. (gk) (Entered: 01/03/2014)
12/16/2013	218	DECLARATION *of Raymond P. Niro* filed by Plaintiff Oplus Technologies, Ltd.. (Niro, Raymond) (Entered: 12/16/2013)
02/03/2014	220	ORDER DENYING DEFENDANT VIZIO, INC.'S MOTION FOR ATTORNEYS' FEES AND EXPERT WITNESS FEES by Judge Mariana R. Pfaelzer: The Court finds that clear and convincing evidence supports the finding that Oplus and its counsel engaged in a vexatious litigation strategy constituting litigation misconduct. However, in its discretion, the Court declines to award attorney fees under 35 U.S.C. Section 285. The Court denies Vizio's Motion for Attorneys' Fees and Expert Witness Fees 190 . (gk) (Entered: 02/03/2014)
02/10/2014	221	NOTICE OF APPEAL to the Federal Circuit filed by Defendant VIZIO, Inc.. (Appeal fee of $505 receipt number 0973-13356421 paid.) (Attachments: # 1 Exhibit A) (Pruetz, Adrian) (Entered: 02/10/2014)
02/11/2014		TRANSMISSION of the Notice of Appeal, Docket Sheet, Judgment and or order e-mailed to the US Court of Appeals for the Federal Circuit re: Notice of Appeal to Federal Circuit Court of Appeals 221 . (dmap) (Entered: 02/11/2014)
02/11/2014	222	MINUTE ORDER IN CHAMBERS by Judge Mariana R. Pfaelzer: Order Denying Vizio's Request to Strike. (rne) (Entered: 02/11/2014)
02/19/2014	223	NOTIFICATION by Circuit Court of Appellate Docket Number 14-1297, Federal Circuit Court regarding Notice of Appeal to Federal Circuit Court of Appeals 221 as to

		Defendant VIZIO, Inc. (dmap) (Entered: 02/21/2014)
03/05/2014	224	BILL OF COSTS. Costs Taxed in amount of $ 11,866.86 in favor of Sears Holding Corp. and against Oplus Technologies, Ltd. RE: APPLICATION to the Clerk to Tax Costs against Plaintiff Oplus Technologies, Ltd. re: 185 , 191 (mb) (Entered: 03/07/2014)
03/27/2014	225	ORDER from 9th CCA filed re: Notice of Appeal to Federal Circuit Court of Appeals 208 filed by VIZIO, Inc., Notice of Appeal to Federal Circuit Court of Appeals 200 filed by Oplus Technologies, Ltd., CCA # 2014-1119, -1131. ON MOTION ORDER (1) The motion is granted. The appeals are dismissed. (2) Each side shall bear its own costs. (3) All pending motions are moot. ISSUED AS MANDATE: received in this district on 3/27/14. (mat) (Entered: 04/01/2014)
03/27/2014	226	MANDATE of 9th CCA filed re: Notice of Appeal to Federal Circuit Court of Appeals 200 and Notice of Appeal to Federal Circuit Court of Appeals 208 CCA # 14-1119, 14-1131. The appeals are dismissed. Mandate received in this district on 3/27/2014. (dmap) (Entered: 04/01/2014)

MDL_DENIED

United States Judicial Panel on Multidistrict Litigation
CIVIL DOCKET FOR CASE #: MDL No. 2400

IN RE: Oplus Technologies, Ltd., Patent Litigation
Assigned to: Not Assigned

Date Filed: 07/23/2012
MDL Status: Denied by Panel
Date Ordered: 10/03/2012
Citation: 899 F.Supp.2d 1373
Date Terminated: 10/03/2012

Plaintiff

Liaison Counsel for Plaintiffs

V.

Defendant

Liaison Counsel for Defendants

Date Filed	#	Docket Text
07/23/2012	1	MOTION TO TRANSFER (INITIAL MOTION) with Brief in Support. -- 4 Action(s) -- from California Central District Court (2:12-cv-05707) - Suggested Transferee Court: N.D. Illinois - Filed by: *Plaintiff Oplus Technologies, Ltd.* (Attachments: # 1 Brief, # 2 Schedule of Actions, # 3 Proof of Service, # 4 Exhibit U.S. Patent 7,271,840 B2, # 5 Exhibit U.S Patent 6,239,842 B1, # 6 Exhibit Complaint 11cv9017, # 7 Exhibit Complaint 11cv9027, # 8 Exhibit Complaint 11cv9029, # 9 Exhibit Complaint 11cv8539, # 10 Exhibit Order 9029, # 11 Exhibit Order 5707, # 12 Exhibit JPML Report, # 13 Exhibit Patent Pilot Program)(Gasey, Arthur) (Entered: 07/23/2012)
07/24/2012	2	MOTION TO TRANSFER (AMENDED) (re: pldg. 1) -- 3 Additional Action(s) -- from Illinois Northern District Court (1:11-cv-09017,1:11-cv-09027,1:11-cv-09029) Filed by: *Oplus Technologies* (Attachments: # 1 Brief, # 2 Schedule of Actions, # 3 Proof of Service)(Gasey, Arthur) (Entered: 07/24/2012)
07/24/2012	3	MDL Number 2400 Assigned -- MOTION FOR TRANSFER ACCEPTED FOR FILING re: pldg. (1 in Pending No. 93) Associated Cases: Pending No. 93, CAC/2:12-cv-05707, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (TLL) (Entered: 07/24/2012)
07/24/2012	4	*****TEXT ONLY NOTICE***** **NOTICE OF FILING AND PUBLICATION OF BRIEFING SCHEDULE *re: pldg. (1 in MDL No. 2400)***

		BRIEFING SCHEDULE IS SET AS FOLLOWS: **Notices of Appearance due on or before 8/7/2012. Corporate Disclosure Statements due on or before 8/7/2012. Responses due on or before 8/14/2012.** Appearance forms (JPML form 18) and Corporate Disclosure forms can be downloaded from our website. Signed by Clerk of the Panel Jeffery N. Luthi, on 7/24/2012. Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (TLL) (Entered: 07/24/2012)
07/30/2012	5	NOTICE OF APPEARANCE re: pldg.(1 in MDL No. 2400), (2 in MDL No. 2400) Filed by Adrian M Pruetz on behalf of Defendant VIZIO, Inc. (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707 (Pruetz, Adrian) (Entered: 07/30/2012)
07/30/2012	6	CORPORATE DISCLOSURE STATEMENT re: pldg. (1 in MDL No. 2400), (2 in MDL No. 2400) -- Identifying **Other Affiliate** AmTRAN Technology Co., Ltd. for VIZIO, Inc.. (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707 (Pruetz, Adrian) (Entered: 07/30/2012)
08/03/2012	7	NOTICE OF APPEARANCE re: pldg.(2 in MDL No. 2400) Filed by Jeffrey K. Sherwood on behalf of Defendant Funai Electric Co., Ltd. (Attachments: # 1 Proof of Service Certificate of Service) Associated Cases: MDL No. 2400, ILN/1:11-cv-09027 (Sherwood, Jeffrey) (Entered: 08/03/2012)
08/03/2012	8	CORPORATE DISCLOSURE STATEMENT re: pldg. (2 in MDL No. 2400) -- Identifying **Corporate Parent** No Parent Corp. for Funai Electric Co., Ltd.. (Attachments: # 1 Proof of Service Certificate of Service) Associated Cases: MDL No. 2400, ILN/1:11-cv-09027 (Sherwood, Jeffrey) (Entered: 08/03/2012)
08/06/2012	9	NOTICE OF APPEARANCE re: pldg.(1 in MDL No. 2400), (2 in MDL No. 2400) Filed by Evan Finkel on behalf of Defendant JVC Americas Corporation (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, ILN/1:11-cv-09029 (Finkel, Evan) (Entered: 08/06/2012)
08/06/2012	10	CORPORATE DISCLOSURE STATEMENT re: pldg. (1 in MDL No. 2400), (2 in MDL No. 2400) -- Identifying **Corporate Parent** JVC KENWOOD CORPORATION for JVC Americas Corporation. (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, ILN/1:11-cv-09029 (Finkel, Evan) (Entered: 08/06/2012)
08/07/2012	11	NOTICE OF APPEARANCE re: pldg.(2 in MDL No. 2400) Filed by Arthur Anthony Gasey on behalf of Plaintiffs Oplus Technologies, Ltd. (Attachments: # 1 Other List of Cases, # 2 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (Gasey, Arthur) Modified on 8/10/2012 (TB). CORRECTION: DELETED

		DUPLICATE PARTIES. (Entered: 08/07/2012)
08/07/2012	12	CORPORATE DISCLOSURE STATEMENT re: pldg. (2 in MDL No. 2400) -- Identifying No Parent Corp. for Oplus Technologies Ltd. (Attachments: # 1 Other List of cases, # 2 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (Gasey, Arthur) Modified on 8/10/2012 (TB). (Entered: 08/07/2012)
08/07/2012	13	NOTICE OF APPEARANCE re: pldg.(1 in MDL No. 2400), (2 in MDL No. 2400) Filed by James J. Lukas, Jr on behalf of Defendant Sears Holdings Corporation (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, ILN/1:11-cv-09017 (Lukas, James) (Entered: 08/07/2012)
08/07/2012	14	CORPORATE DISCLOSURE STATEMENT re: pldg. (1 in MDL No. 2400), (2 in MDL No. 2400) -- Identifying **Corporate Parent** ESL Investments, Inc., **Corporate Parent** ESL Institutional Partners, L.P., **Corporate Parent** CRK Partners, LLC, **Corporate Parent** ESL Partners, L.P., **Corporate Parent** ESL Investors L.L.C., **Corporate Parent** RBS Partners, L.P., **Corporate Parent** RBS Investment Management, L.L.C., **Corporate Parent** Tynan LLC, **Corporate Parent** CRK LLC for Sears Holdings Corporation. (Attachments: # 1 Schedule A, # 2 Proof of Service) Associated Cases: MDL No. 2400, ILN/1:11-cv-09017 (Lukas, James) Modified on 8/14/2012 (TB). ADDED CORPORATE DATA. (Entered: 08/07/2012)
08/08/2012	15	HEARING ORDER re: pldg. (1 in MDL No. 2400), (2 in MDL No. 2400) - SECTION A (DESIGNATED FOR ORAL ARGUMENT) **PANEL HEARING set for 9/20/2012 in New York, New York. Notices of Presentation or Waiver of Oral Argument due on or before 8/31/2012**. Notice of Presentation or Waiver of Oral Argument form (JPML form 9) can be downloaded from our website. Signed by Judge John G. Heyburn II, Chairman, PANEL ON MULTIDISTRICT LITIGATION, on 8/8/2012. Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (RH) (Entered: 08/08/2012)
08/10/2012	16	CORPORATE DISCLOSURE STATEMENT (AMENDED) - re: pldg. (6 in CAC/2:12-cv-05707, 2 in ILN/1:11-cv-08539, 4 in ILN/1:11-cv-09017, 6 in ILN/1:11-cv-09027, 6 in ILN/1:11-cv-09029, 12 in MDL No. 2400) Identifying **Corporate Parent** Oplus Technologies, LLC for Oplus Technologies, Ltd. (Attachments: # 1 Other Schedule of Cases, # 2 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (Gasey, Arthur) Modified on 8/13/2012 (TB). CORRECTION: REMOVED DUPLICATE PARTIES. (Entered: 08/10/2012)
08/14/2012	17	RESPONSE IN OPPOSITION WITH MEMORANDUM -- *(re: pldg. (2 in MDL*

		No. 2400)) Filed by Defendants Sears Holdings Corporation, VIZIO, Inc., Funai Electric Co., Ltd., JVC Americas Corporation - (Attachments: # 1 Exhibit 1 - Judge Dow Order from 6/15/2012, # 2 Exhibit 2 - Judge Darrah Order from 6/21/2012, # 3 Exhibit 3 - Oplus Complaint Against Sears and JVC Americas, # 4 Exhibit 4 - Oplus Complaint Against Sears and D&M, # 5 Exhibit 5 - Order Denying Transfer in MDL No. 2377, # 6 Exhibit 6 - Oplus First Amended Complaint Against VIZIO, # 7 Exhibit 7 - VIZIO Motion to Sever, Transfer, and Stay Claims, # 8 Exhibit 8 - JVC Americas Motion to Sever, Transfer, and Stay Claims, # 9 Exhibit 9 - Oplus Complaint Against Funai, # 10 Exhibit 10 - Oplus Motion to Dismiss Sears, # 11 Exhibit 11 - Joint Initial Status Report, # 12 Exhibit 12 - Notice of Hearing for U.S. Judicial Panel on Multidistrict Litigation, # 13 Declaration of Goro Seki, # 14 Declaration of Harvey Mitnick, # 15 Declaration of Kenneth Lowe, # 16 Declaration of Rob Brinkman, # 17 Declaration of James J. Lukas, # 18 Exhibit A to Declaration of James J. Lukas, # 19 Exhibit B to Declaration of James J. Lukas, # 20 Exhibit C to Declaration of James J. Lukas, # 21 Exhibit D to Declaration of James J. Lukas, # 22 Exhibit E to Declaration of James J. Lukas, # 23 Exhibit F to Declaration of James J. Lukas, # 24 Exhibit G to Declaration of James J. Lukas, # 25 Exhibit H to Declaration of James J. Lukas, # 26 Declaration of Adrian M. Pruetz, # 27 Exhibit A to Declaration of Adrian M. Pruetz, # 28 Exhibit B to Declaration of Adrian M. Pruetz, # 29 Exhibit C to Declaration of Adrian M. Pruetz, # 30 Exhibit D to Declaration of Adrian M. Pruetz) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (Pruetz, Adrian) Modified on 8/15/2012 (TB). REMOVED DUPLICATE PARTIES. (Entered: 08/14/2012)
08/15/2012	18	CERTIFICATE OF SERVICE re: pldg. (9 in CAC/2:12-cv-05707, 5 in ILN/1:11-cv-08539, 9 in ILN/1:11-cv-09017, 9 in ILN/1:11-cv-09027, 9 in ILN/1:11-cv-09029, 17 in MDL No. 2400) Filed by Defendants VIZIO, Inc., Vizio, Inc. -- Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029 (Pruetz, Adrian) (Entered: 08/15/2012)
08/21/2012	19	AMENDMENT TO THE HEARING SESSION ORDER - AND ATTACHED SCHEDULE FILED August 8, 2012 re: pldg. (1 in MDL No. 2400), (15 in MDL No. 2400), (2 in MDL No. 2400) To include the motion(s) to transfer filed by Plaintiff Oplus Technologies, Ltd., NJ 2:12-5231 - SECTION A (DESIGNATED FOR ORAL ARGUMENT) **PANEL HEARING set for 9/20/2012 in New York, New York.** Signed by Clerk of the Panel Jeffery N. Luthi on 8/21/2012. Associated Cases: MDL No. 2400, NJ/2:12-cv-05231 (TB) (Entered: 08/21/2012)
08/21/2012	20	REPLY TO RESPONSE TO MOTION FOR TRANSFER re: pldg. (9 in CAC/2:12-cv-05707, 5 in ILN/1:11-cv-08539, 9 in ILN/1:11-cv-09017, 9 in ILN/1:11-cv-09027, 9 in ILN/1:11-cv-09029, 17 in MDL No. 2400), (2 in MDL No. 2400) Filed by

		Plaintiffs Oplus Technologies, Ltd., Oplus Technologies, Ltd., Oplus Technologies, Ltd., Oplus Technologies, Ltd., Oplus Technologies, Ltd., Oplus Technologies, Ltd. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029, NJ/2:12-cv-05231 (Gasey, Arthur) (Entered: 08/21/2012)
08/29/2012	21	NOTICE OF APPEARANCE re: pldg.(1 in MDL No. 2400), (20 in MDL No. 2400, 2 in NJ/2:12-cv-05231), (17 in MDL No. 2400), (2 in MDL No. 2400) Filed by Evan Finkel on behalf of Defendant JVC AMERICAS CORPORATION (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, NJ/2:12-cv-05231 (Finkel, Evan) (Entered: 08/29/2012)
08/29/2012	22	NOTICE OF PRESENTATION OF ORAL ARGUMENT re: pldg. (9 in CAC/2:12-cv-05707, 17 in MDL No. 2400), (7 in CAC/2:12-cv-05707, 15 in MDL No. 2400) Filed by Adrian M Pruetz on behalf of Defendant VIZIO, Inc. (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707 (Pruetz, Adrian) (Entered: 08/29/2012)
08/30/2012	23	NOTICE OF PRESENTATION OF ORAL ARGUMENT re: pldg. (17 in MDL No. 2400), (20 in MDL No. 2400, 2 in NJ/2:12-cv-05231), (15 in MDL No. 2400), (2 in MDL No. 2400) Filed by Evan Finkel on behalf of Defendant JVC AMERICAS CORPORATION (Attachments: # 1 Proof of Service) Associated Cases: MDL No. 2400, NJ/2:12-cv-05231 (Finkel, Evan) (Entered: 08/30/2012)
08/30/2012	24	NOTICE OF PRESENTATION OF ORAL ARGUMENT re: pldg. (7 in ILN/1:11-cv-09027, 15 in MDL No. 2400), (9 in ILN/1:11-cv-09027, 17 in MDL No. 2400) Filed by Jeffrey K. Sherwood on behalf of Defendant Funai Electric Co., Ltd. Associated Cases: MDL No. 2400, ILN/1:11-cv-09027 (Sherwood, Jeffrey) (Entered: 08/30/2012)
08/31/2012	25	NOTICE OF PRESENTATION OF ORAL ARGUMENT re: pldg. (7 in CAC/2:12-cv-05707, 3 in ILN/1:11-cv-08539, 7 in ILN/1:11-cv-09017, 7 in ILN/1:11-cv-09027, 7 in ILN/1:11-cv-09029, 15 in MDL No. 2400) Filed by Arthur Anthony Gasey on behalf of Plaintiff Oplus Technologies, Ltd. (Attachments: # 1 Other Attachment-List of Cases, # 2 Proof of Service) Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029, NJ/2:12-cv-05231 (Gasey, Arthur) Modified on 9/4/2012 (RH). REMOVED DUPLICATE PARTY NAMES (Entered: 08/31/2012)
10/03/2012	26	ORDER DENYING TRANSFER re: pldg. (7 in CAC/2:12-cv-05707, 3 in ILN/1:11-cv-08539, 7 in ILN/1:11-cv-09017, 7 in ILN/1:11-cv-09027, 7 in ILN/1:11-cv-09029, 15 in MDL No. 2400), (1 in MDL No. 2400), (2 in MDL No. 2400) The motion to transfer, pursuant to 28 U.S.C. 1407, is DENIED Signed by Judge John G. Heyburn II, Chairman, PANEL ON MULTIDISTRICT LITIGATION, on 10/3/2012.

		Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029, NJ/2:12-cv-05231 (LAH) (Entered: 10/03/2012)
11/13/2012	27	OFFICIAL TRANSCRIPT of Hearing held on 9/20/2012 before the Panel at New York, NY. Court Reporter/Transcriber *Southern District Reporters, P.C., 500 Pearl Street, Room 330, New York, NY 10007, (212) 805-0300*. Transcript may be viewed at the Panel's office or purchased through the Court Reporter/Transcriber before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER. **Notice of Redaction due 11/20/2012.** **Redaction Request due 12/4/2012.** **Redacted Transcript Deadline set for 12/14/2012.** **Release of Transcript Restriction set for 2/11/2013.** Signed by Judge John G. Heyburn II, Chairman, PANEL ON MULTIDISTRICT LITIGATION, on 11/13/2012. Associated Cases: MDL No. 2400, CAC/2:12-cv-05707, ILN/1:11-cv-08539, ILN/1:11-cv-09017, ILN/1:11-cv-09027, ILN/1:11-cv-09029, NJ/2:12-cv-05231 (RH) (Entered: 11/13/2012)

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Segman

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(45) **Date of Patent: May 29, 2001**

(54) **METHOD OF DE-INTERLACING VIDEO SIGNALS USING A MIXED MODE SPATIAL AND TEMPORAL APPROXIMATION TECHNIQUE**

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(52) **U.S. Cl.** **348/448**; 348/441; 348/459
(58) **Field of Search** 348/448, 441, 348/458, 459, 443, 445, 452, 454, 910; H04N 7/01

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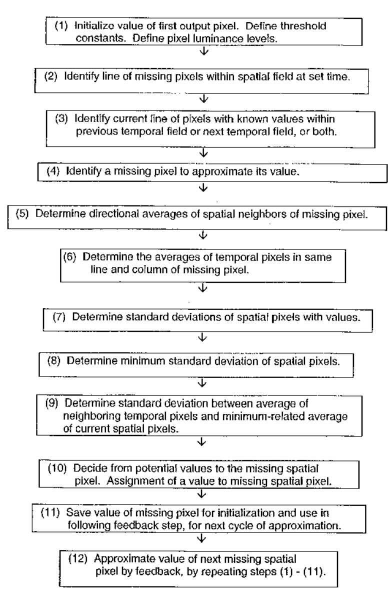
(57) **ABSTRACT**

A method of de-interlacing interlaced video formats using a mixed mode spatial and temporal approximation technique. This method can be implemented with input of known pixel values obtained from only two fields, featuring the current spatial field containing missing pixels, and either of two neighbor temporal fields containing known pixels. Decision steps requiring evaluation of a series of logical operations lead to assignment of values to missing spatial pixels. There is a feedback step of approximated values of missing pixels from one cycle to the next cycle of approximation of missing pixel values. This method is applicable to a variety of video interlaced signals, including interlaced RGB component signals, and video signals containing luminance and chrominance components. Video de-interlacing according to the present invention is an efficient way of having image processing devices operating with interlaced technology be compatible with visual display monitors operating with de-interlaced (progressive) high resolution scan format systems. Moreover, the method of this invention is applicable to real time and off-line modes of operation of video and television systems currently using interlaced scanning formats.

19 Claims, 5 Drawing Sheets



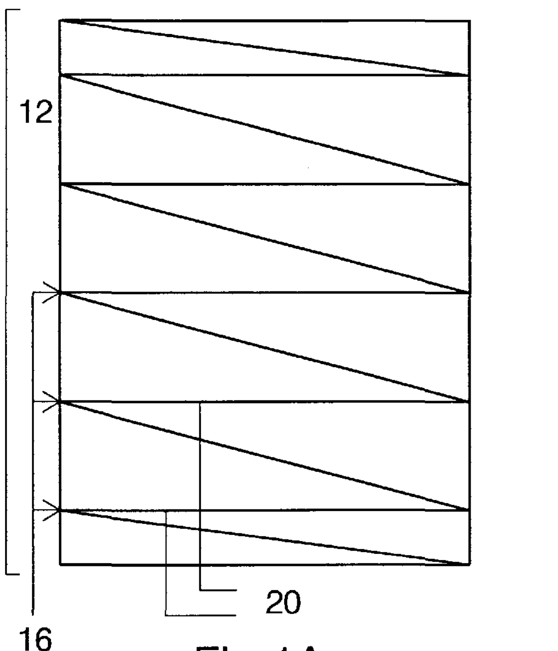


Fig.1A

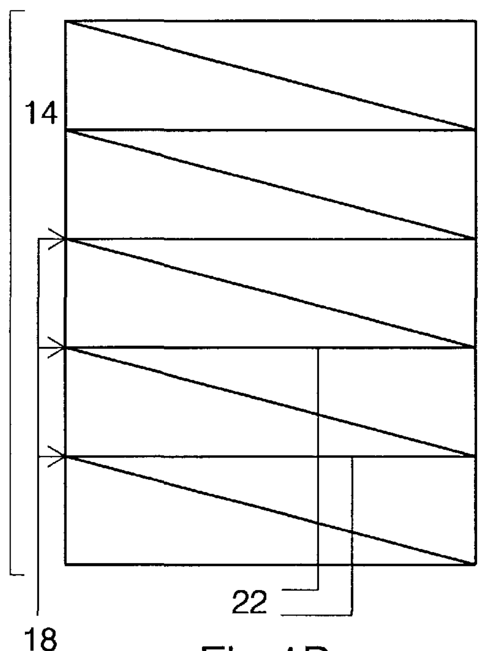


Fig.1B

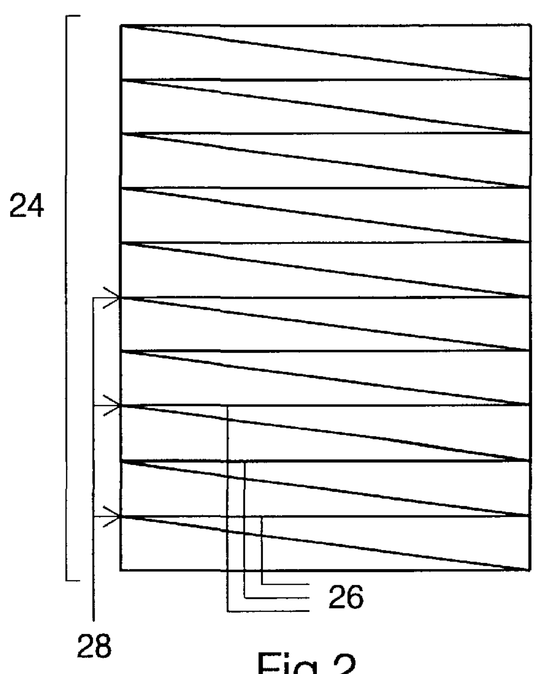


Fig.2

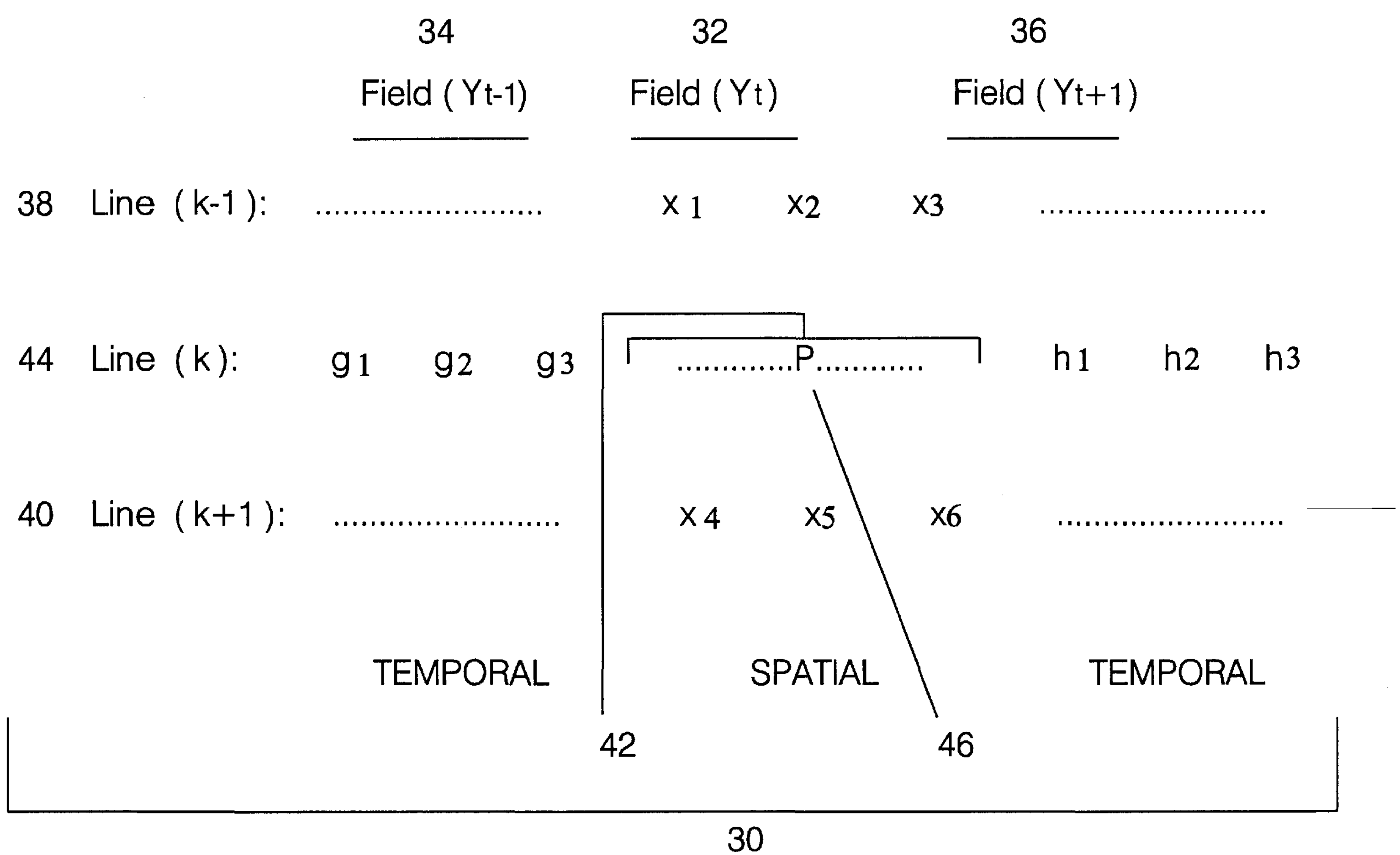

34
Field (Yt-1)
32
Field (Yt)
36
Field (Yt+1)
38 Line (k-1): .... x1 x2 x3 ....
44 Line (k): g1 g2 g3 ....P........... h1 h2 h3
40 Line (k+1): .... x4 x5 x6 ....
TEMPORAL
SPATIAL
TEMPORAL
42
46
30

Fig.3

(1) Initialize value of first output pixel. Define threshold constants. Define pixel luminance levels.

↓

(2) Identify line of missing pixels within spatial field at set time.

↓

(3) Identify current line of pixels with known values within previous temporal field or next temporal field, or both.

↓

(4) Identify a missing pixel to approximate its value.

↓

(5) Determine directional averages of spatial neighbors of missing pixel.

↓

(6) Determine the averages of temporal pixels in same line and column of missing pixel.

↓

(7) Determine standard deviations of spatial pixels with values.

↓

(8) Determine minimum standard deviation of spatial pixels.

↓

(9) Determine standard deviation between average of neighboring temporal pixels and minimum-related average of current spatial pixels.

↓

(10) Decide from potential values to the missing spatial pixel. Assignment of a value to missing spatial pixel.

↓

(11) Save value of missing pixel for initialization and use in following feedback step, for next cycle of approximation.

↓

(12) Approximate value of next missing spatial pixel by feedback, by repeating steps (1) - (11).

FIG. 4

(1) Initialize value of first output pixel.
(a) first initialization, set output value of previous pixel value (Previous-Result) = 0.
Define threshold constants.
- A_i = (threshold constant i), for i = 1 to 8.

Define pixel luminance levels.
- B = Darkness level (black level). - W = Brightness level (white level).

(2) Identify line of missing pixels within spatial field at a given set time.
(a) set-up matrix representation of pixels in grid space (Figure 3).
- missing spatial pixels located in horizontal line **42** in Line (k) **44**.

(3) Identify current line of pixels with known values within previous temporal field or next temporal field, or both.
(a) refer to matrix representation of pixels in grid space (Figure 3).
- temporal pixels with values located in Line (k) **44**, in previous temporal Field (Y_{t-1}) **34**, having values g_1, g_2, g_3.
- temporal pixels with values located in Line (k) **44**, in next temporal Field (Y_{t+1}) **36**, having values h_1, h_2, h_3.

(4) Identify a missing pixel in the line of missing pixels, whose value is to be approximated.
(a) refer to matrix representation of pixels in grid space (Figure 3).
- missing spatial pixel **P 46** located in Line (k) **44** of missing pixels, in spatial Field (Y_t) **32**.

(5) Determine directional averages of spatial neighbors of missing pixel.
(a) pixel values from matrix representation of pixels in grid space (Figure 3).
- spatial pixels with values located in Line (k - 1) **38**, and in Line (k + 1) **40**, in current spatial Field (Y_t) **32**, having values x_1, x_2, x_3, and x_4, x_5, x_6.

(b) evaluate directional averages, m_i, of spatial pixels with values, where $m_1 = a_1x_1 + a_2x_6$, $m_2 = b_1x_2 + b_2x_5$, and $m_3 = c_1x_3 + c_2x_4$, with $a_1 + a_2 = 1$, $b_1 + b_2 = 1$, and $c_1 + c_2 = 1$, where coefficients a_i, b_i, and c_i are positive constants.

(6) Determine averages of temporal pixels in same line and column of missing pixel.
(a) pixel values from matrix representation of pixels in grid space (Figure 3).
- temporal pixel with a value located in Line (k) **44**, in previous temporal Field (Y_{t-1}) **34**, having value g_2, and temporal pixel with a value located in Line (k) **44**, in next temporal Field (Y_{t+1}) **36** having value h_2.

(b) evaluate the average, m_T, of temporal pixels with values, where $m_T = d_1g_2 + d_2h_2$, with $d_1 + d_2 = 1$, and where coefficients d_1 and d_2 are positive constants, greater than or equal to zero.
(c) evaluate the average, n_T, of temporal pixels with values, where $n_T = e_1g_1 + e_2h_1$, with $e_1 + e_2 = 1$, and where coefficients e_1 and e_2 are positive constants, greater than or equal to zero.

FIG. 5/1

(7) **Determine the standard deviations of spatial pixels with known values, in the same field as the missing spatial pixel.**

(a) evaluate standard deviations, Sigma i, for i = 1 to 3, where Sigma 1 = s_1 [abs (x_1 - m_1)], Sigma 2 = s_2 [abs (x_2 - m_2)], and Sigma 3 = s_3 [abs (x_3 - m_3)], where s_i (for i = 1 to 3) is a positive constant, and equations of Sigma i are approximations to the standard deviations.

(8) **Determine the minimum standard deviation of known spatial pixels.**

(a) evaluate the minimum standard deviation, Min-Sigma, from the set of Sigma i (i = 1 to 3), where Min-Sigma = Min [Sigma i] for 1<= i <= 3.

- define m_j (where j = i) equal to the average of spatial pixel values related to Min-Sigma.

(9) **Determine the standard deviation between the average of neighbor temporal pixels and the minimum-related average of current spatial pixels.**

(a) evaluate the standard deviation, Sigma, where Sigma = abs (m_T - m_j), where m_T and m_j were previously evaluated.

(10) **Decide from potential values to the missing spatial pixel, and assign a value to the missing spatial pixel.**

(a) evaluate logical operations of linear combinations of averages, standard deviations, minimum standard deviations, absolute values of differences between average values of pixels and known values of pixels, and known values of pixels, with previously defined threshold constants, and pixel luminance levels.

(b) assign the value of the correct decision to the missing spatial pixel.

- If (i) Sigma <= (K0 + Min-Sigma), where -C_0 <= K0 < C_0, or
  (ii) Min-Sigma >= (W - K1), where -C_1 <= K1 < C_1, or
  (iii) abs (m_T - x_1) < A1, or (iv) abs (m_T - x_2) < A2, or
  (v) abs (m_T - x_3) < A3, or (vi) abs (m_T - x_4) < A4, or
  (vii) abs (m_T - x_5) < A5, or (viii) abs (m_T - x_6) < A6, or
  (ix) m_T <= (B + K2), where -C_2 <= K2 < C_2, or
  (x) [(Previous-Result) - n_T <= A6] and [m_T >= W - A7], then:
  - If Sigma < A8, value of the missing spatial pixel (**P 46** in Fig. 3) is assigned as: **P** = (m_T + m_j) * K3, where 0 < K3 < 1.
  - If Sigma >= A8, value of the missing spatial pixel (**P 46** in Fig. 3) is assigned as: **P** = m_T.
- If none of (i) through (x) is correct, then value of missing spatial pixel (**P 46** in Fig. 3) is assigned as: **P** = m_j.

(11) **Save value of missing pixel, P, for next feedback step (Step (12)).**

(a) assign value of current missing pixel to previous result, as (Previous-Result) = **P**, for use in initialization of the next feedback cycle.

(12) **Approximate a value of a next missing spatial pixel by feedback, by repeating Steps (1) through (11).**

FIG. 5/2

METHOD OF DE-INTERLACING VIDEO SIGNALS USING A MIXED MODE SPATIAL AND TEMPORAL APPROXIMATION TECHNIQUE

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to processing of video signals. In particular, this invention relates to a method of de-interlacing interlaced video formats using a mixed mode spatial and temporal approximation technique.

Video signals are currently represented as sequences of a) fields in case of interlace scan refresh or b) frames according to non-interlace or progressive scan refresh. In the interlaced scan format, a single image (frame) is represented using a pair of fields. One field of the pair features pixels located in alternate rows (odd numbered horizontal lines, for example) of the field matrix. The second field of the pair features pixels located in the same field matrix only in the corresponding horizontal lines (even numbered horizontal lines, for example) which were missing pixels in the first field, such that portions of the image not represented in the first field are represented in the second field. In the interlaced scan format, each field of image data is scanned twice, once for the odd numbered horizontal lines of the field, and another time for the even numbered horizontal lines of the field, in order to have all of the horizontal lines of the odd field followed by all of the horizontal lines of the even field. The pair of fields of odd and even horizontal lines in interlaced video constitute the frame (one full resolution picture or image). In contrast, in the de-interlaced or progressive scan format, an image is represented in its entirety using only a single field which includes pixels in all horizontal lines of the field matrix. Here, each frame (field) of image data is scanned once from the top horizontal line to the bottom horizontal line without requiring interlacing action between two fields.

In the interlace scan format, the first and second fields of a pair are scanned consecutively on a video display monitor at a rate of 60 fields per second, in order to reconstruct single image frames on the display at the industry interlaced scan standard of 30 frames per second. In more recently developed video representation technique using de-interlacing (progressive scan format) format, frames are progressively scanned on a display at the standard progressive display rate of 60 frames per second.

Application of current interlace scan format to television, includes the NTSC (National Television System Committee) and the PAL (Phase Alternation by Line) systems. In the NTSC format, there are 262.5 horizontal scanning lines per field (including one odd numbered field, and one even numbered field), translating to 525 scanning lines per frame, with an established scan rate of (60 fields) 30 frames per second. In the PAL format, there are 312.5 horizontal scanning lines per field (including one odd numbered field, and one even numbered field), translating to 625 scanning lines per frame, with an established scan rate of (50 fields) 25 frames per second.

New display systems such as CRT (PC monitors), flat liquid crystal device (LCD) panels, plasma display panels (PDP), and video equipment, including cameras, broadcast station transmitters and high definition television (HDTV) desktop or workstation display monitors are using de-interlaced (progressive) high resolution scan format systems such as VGA(480 lines×640 columns per frame), SVGA(600 lines×800 columns per frame), XGA(768 lines×1024 columns per frame), and UXGA(1200 lines×1600 columns per frame) to scan and display image data. An example showing the need for de-interlacing interlaced video data, is a typical LCD display having 480 horizontal scanning lines with 640 dots per scanning line (VGA system). Since LCD display systems are designed to be scanned in the de-interlaced format, when the need is to display NTSC (525 lines per frame) and PAL (625 lines per frame) image signals on an LCD display, interlaced image signals need to be converted into de-interlaced image signals for proper display.

It is known that higher quality image reproductions are obtained by using de-interlaced scanned format rather than interlaced scan format, because interlaced displays are more likely to exhibit visual artifacts (such as line crawl on diagonal edges of an image, and interline flicker on horizontal edges of an image) than de-interlaced scan displays. As a result, there has been substantial effort towards developing methods of converting or de-interlacing interlaced video image data suitable for display on de-interlaced or progressive scan format devices.

Several conversion or de-interlacing methods, devices, and systems for video image processing have been developed, most of which feature one or a more of a variety of spatial, temporal, or spatio-temporal interpolation processing for estimating the values of missing pixels in an interlaced frame. The relative suitably of these techniques depends on the resulting image quality. Moreover, different interpolation techniques and systems work better under different conditions.

U.S. Pat. No. 5,661,525 issued to Kovacevic et al., features a method for de-interlacing an interlaced video frame sequence using interpolation of spatial and temporal pixels for estimating values of missing pixels. The interpolations are weighted according to the errors each one introduces for generating the approximations of missing pixel values for a de-interlaced frame. In these interpolations, three fields of pixels are used, i.e., the current spatial field and the two neighboring (immediately preceding and following) fields of pixels are used for estimating values of missing pixels in the current spatial field. In U.S. Pat. No. 5,793,435 issued to Ward et al., a de-interlacing system for converting an interlaced video to a progressive video features a variable coefficient, non-separable spatio-temporal interpolation filter. Reference and offset video signals are weighted together with filter coefficients in the spatio-temporal interpolation filter, to produce an interpolated video signal. The interpolated video signal is interleaved with the reference video signal, suitably delayed to compensate for filter processing time, to produce the de-interlaced video signal. U.S. Pat. No. 5,621,470 issued to Sid-Ahmed makes use of interpolation in an inter-pixel and inter-frame arrangement and incorporates a 3D (low pass) filter to support such actions. The 3D interpolator produces twice the number of pixels along each horizontal line, twice the number of lines in each frame and double the number of frames per second. Another interpolation filter apparatus applied to de-interlacing is presented in U.S. Pat. No. 5,559,905 issued to Greggain et al., in which interpolation of a stream of input pixels involves a filter providing a means for aligning the stream of input pixels and the first derived stream of sampled (output) pixels at the boundaries of the image, at a predetermined interpolation rate. U.S. Pat. No. 5,650,824 issued to Si Jun Huang, includes the use of a filter which performs linear interpolation on interlaced image data, involving two neighboring field samples for each odd field and even field input.

An example of a device for implementing an interpolation method of de-interlacing video signals is given in U.S. Pat. No. 5,717,466 issued to Shao Wei Pan et. al., featuring an enhanced video circuit for performing (linear and non-linear) non-uniform interpolation of video scan lines. A real-time video system which incorporates the circuit device featured in U.S. Pat. No. 5,717,466, is shown in U.S. Pat. No. 5,742,350, issued to the same.

Current methods of de-interlaced video signals are notably limited with respect to de-interlacing video images featuring textual data. Standard approximation methods currently used for de-interlacing interlaced video signals are typically based on interpolation techniques, for evaluating missing pixels in interlaced fields of video signals. These interpolation techniques require the use of no less than three fields of pixels with known values for estimating values of missing pixels.

A more accurate and comprehensive approximation method for de-interlacing interlaced video signals involves usage of logical operations, for making decisions leading to assignment of highly accurate values of missing pixels, included in a technique which involves extrapolation, and not only interpolation, of missing pixels in interlaced fields of video signals. Moreover, a de-interlacing method which requires less than three fields of pixels with known values for approximating values of missing pixels would translate to a significant savings of resources required for de-interlacing. A method requiring input information from two, instead of three, fields of pixels with known values would require measurably less data processing resources including hardware, software, memory, and calculation time. There is thus a need for, and it would be useful to have, an accurate and comprehensive method of de-interlacing interlaced video signals currently used in standard video and television devices, which is generally applicable to both numerical and textual image data, and which requires fewer resources. Moreover, there is a need for such an improved de-interlacing method applicable to either real time or off-line mode of operation of video and television signal de-interlacing.

SUMMARY OF THE INVENTION

The present invention relates to a method of de-interlacing interlaced video signals using a mixed mode spatial and temporal approximation technique.

Hereinafter, the term ‘current’ is used with respect to a given set time of de-interlacing an interlaced video signal, and is used as a temporal reference point in describing the approximation method of the present invention, whether the interlaced video signal be in real time or off-line mode of operation. Hereinafter, the term ‘logical operations’ refers to usage of the known logical operators of ‘less than’, ‘less than or equal to’, ‘greater than’, ‘greater than or equal to’, ‘and’, ‘or’, and ‘xor’. Spatial pixels of a current spatial field of pixels, and pixels of the previous and/or the following temporal fields, are used as inputs of the approximation method.

The method of video de-interlacing of the present invention is based on a unique mixed mode spatial and temporal approximation technique, involving approximating missing pixels of interlaced (half) fields required to form a single de-interlaced frame (raster) of pixels positioned in grid space of a visual display device. The method of the present invention provides the unique capability of implementation using input information from only two, instead of using the conventional three fields of pixels with known values, for approximating values of missing pixels in a current spatial field, i.e., in addition to the current spatial field featuring known and missing values of spatial pixels, only one neighboring temporal field having temporal pixels with known values need be used for performing all necessary calculations, determinations, and evaluations for completely de-interlacing an interlaced video signal. The method of the present invention involves unique usage of logical operations, for making decisions leading to assignment of highly accurate values of missing pixels. Additionally, the method of the present invention includes a feedback step for continuation of the approximation method of evaluating a value of a next missing pixel, following evaluation of a previous missing pixel.

A preferred embodiment of a method of video de-interlacing of the present invention features the following principle steps: (1) initialization of the value of the first output pixel, and definition of threshold constants and pixel luminance levels (where luminance refers to brightness or darkness), to be used in a later decision step in evaluating missing pixels, (2) identification of a line of missing pixels within a spatial field at a set time, (3) identification of a current line of pixels with known values within the previous temporal field or the next temporal field, or within both the previous temporal field and the next temporal fields, (4) identification of a missing spatial pixel in the line of missing spatial pixels, (5) determination of directional averages of the spatial neighbors of the missing spatial pixel, in the current spatial field, at the set time, (6) determination of averages of temporal pixels located in the same line and column of the missing spatial pixel, but in previous and/or next temporal fields, (7) determination of standard deviations of the spatial pixels with known values, located in the same field as the missing spatial pixel, (8) determination of the minimum standard deviation of the spatial pixels. (9) determination of the standard deviation between the average of the neighboring temporal pixels, and the average of the current spatial pixels related to the minimum standard deviation of step (8), (10) deciding from several potential values to the missing spatial pixel, based on evaluation of a series of logical operations of previously determined values, leading to assignment of a value to the missing spatial pixel, (11) saving the value of step (10), for use in performing the following feedback step for approximating a value of a next missing spatial pixel, and (12) approximation of a value of a next missing spatial pixel by feedback, by repeating steps (1) through (11).

There are several ways to represent color video. Currently, video broadcasts are based on formats such as YUV, and YCrCb, where Y is known as the luminance (brightness or darkness) component and UV or CrCb are different chrominance (color) components. The above outlined method is generally applicable to any type of interlaced video signal format, including interlaced color video formats.

The method of the present invention, may be similarly implemented for the case of video interlaced RGB signals, whereby the above method (steps (1) through (11)) is repeated for each color component (red, green, and blue).

The method of the present invention, may be similarly implemented for the case of video interlaced signals represented by luminance and chrominance components (for example, YUV, YCrCb), whereby the above method (steps (1) through (11)) is repeated only for the luminance components (the Y part), and an approximation is performed for the chrominance components (the CrCb part), from information obtained from the decision step (10).

According to the present invention, there is provided a method for de-interlacing an interlaced video format, the method comprising the steps of: (a) receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced, and (b) using a current spatial field featuring missing spatial pixels and the spatial pixels with known values, located in the sequence of the fields, and at least one temporal field featuring temporal pixels with known value, located in the sequence of the fields, for determining values of the missing pixels of the current spatial field.

According to the present invention, there is provided a method for de-interlacing an interlaced video format, the method comprising the steps of: (a) receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced, (b) evaluating logical operations of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of the known values of temporal pixels, standard deviations of the known values of the spatial pixels, standard deviation of the known values of the temporal pixels, minimum of the standard deviations of the known values of the spatial pixels, absolute values of differences between the averages of the known values of the temporal pixels and the known values of the spatial pixels, the known values of the spatial pixels, and a plurality of constants, the logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor', and (c) deciding upon assignment of values to missing spatial pixels according to results of the logical operations.

The method of video de-interlacing of the present invention, leads to the capability of using image processing devices operating with interlaced technology to be compatible with visual display monitors operating with de-interlaced (progressive) high resolution scan format systems. Moreover, the method of video de-interlacing of the present invention is applicable to either real time or off-line mode of operation of video and television signal de-interlacing.

The present invention could be implemented by hardware or by software on any operating system of any firmware or a combination thereof. For example, as hardware, the invention could be implemented as a chip or a circuit. As software, the invention could be implemented as a plurality of software instructions being executed by a computer using any suitable operating system. In any case, the steps of the method of the invention could be described as being performed by a data processor, such as a computing platform for executing a plurality of instructions, regardless of the implementation of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. **1A** is an illustration of an odd field (one half of odd lines of a single frame) of an interlaced scan format;

FIG. **1B** is an illustration of an even field (one half of even lines of a single frame) of an interlaced scanned format;

FIG. **2** is an illustration of a single frame (two fields at the same time) of a de-interlaced scanned format;

FIG. **3** shows an example of a matrix representation of pixel rid space for a given spatial field and immediate neighboring temporal fields of an interlaced video signal;

FIG. **4** is a flow diagram of a preferred embodiment of the method for de-interlacing a sequence of interlaced fields according to the present invention; and

FIG. **5** (comprising two pages as FIG. **5/1**, and FIG. **5/2** as continuation of FIG. **5/1**) is a flow diagram of an exemplary preferred embodiment for implementing the method of the video de-interlacing method according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is of a method of de-interlacing interlaced video signals using a mixed mode spatial and temporal approximation method. The approximation method includes a decision step, featuring evaluation of a series of logical operations leading to a decision of assignment of a value to a missing pixel in an interlaced field of a video signal, and assignment of a value to that missing pixel based on the correct comparison. The approximation method includes feedback of the approximated value of a previous missing pixel, to the initial step of the approximation method, for approximation of a next missing pixel.

The components and operation of a method of de-interlacing video signals according to the present invention are better understood with reference to the drawings and the accompanying description. It is to be noted that illustrations of the present invention shown here are for illustrative purposes only and are not meant to be limiting.

Referring now to the drawings, FIG. **1** is an illustration of a pair **10** of an odd field **12** and of an even field **14** of an interlaced scanned format. FIG. **1A** is an illustration of the odd field **12**, featuring one half of odd lines of a single frame of an interlaced scan format (i.e., each frame includes one odd field and one even field). In terms of an electronic device providing visual display of video signals, the odd field **12** of the pair **10** features lines of pixels **20**, located in alternate rows **16** (odd numbered horizontal lines, for example) of grid space, also corresponding to a field matrix representation (FIG. **3**).

FIG. **1B** is an illustration of the even field **14**, featuring one half of even lines of a single frame of an interlaced scan format. The even field **14** of the pair **10** features lines of pixels **22** located in the same grid space as the lines of pixels **20** in the odd field **12**, but only in correspondingly alternate rows **18** (even numbered horizontal lines, for example) which were missing pixels in the odd field **12**, such that portions of the image not represented in the odd field **12** are now represented in the even field **14**. Each field of the pair **10** includes pixels representative of one-half of a complete single image which was recorded, such that sequential scanning of both fields of pixels **12** and **14** is required for reconstructing the image.

FIG. **2** shows an illustration of a single frame **24** (two fields at the same time) of a de-interlaced scanned format. Frame **24** includes horizontal lines of pixels **26** in both odd and even horizontal rows **28**, such that scanning the single frame captures the entire image in contrast to the need for sequential scanning of both the odd field **12** and the even field **14** of the interlaced scanned format **10** of FIG. **1**.

FIG. **3** shows an example of a matrix representation **30** of pixel grid space for a given spatial field and immediate neighboring temporal fields of an interlaced video signal. The matrix representation **30** is referred to in the corresponding preferred embodiment of a mixed mode spatial and temporal approximation method of the present invention (FIGS. **4** and **5**), where a missing pixel (P **46** in FIG. **3**), included in a sequence of interlaced fields of a video signal, is determined as part of the method of converting interlaced scanned format video signals to de-interlaced scanned format video signals.

In FIG. **3**, matrix representation **30**, a sequence of temporally related luminance fields is featured as Field (Y_t) **32**, Field (Y_{t-1}) **34**, and Field (Y_{t+1}) **36**. At a given set time of receiving an interlaced video signal, Field (Y_t) **32** represents a current spatial field, Field (Y_{t-1}) **34** represents the previous temporal field, and Field (Y_{t+1}) **36** represents the next temporal field. The current spatial field, Field (Y_t) **32** includes spatial pixels x_1, x_2, and x_3 in Line (k−1) **38**, and spatial pixels x_4, x_5, and x_6 in Line (k+1) **40**. The horizontal line **42** is missing spatial pixels in Line (k) **44**. The temporal fields, Field (Y_{t-1}) **34**, and Field (Y_{t+1}) **36** include temporal pixels g_1, g_2, and g_3 in Line (k) **44**, and temporal pixels h_1, h_2, and h_3 in Line (k) **44**, respectively. Spatial pixel P **46**, represents a missing spatial pixel located in Line (k) **44**, of the current spatial field, Field (Y_t) **32**. Spatial pixel P **46** is to be approximated from spatial information located in the current spatial field, Field (Y_t) **32**, and from temporal information located in either one or both temporal fields, Field (Y_{t-1}) **34**, and Field (Y_{t+1}) **36**, using a mixed mode spatial and temporal approximation method of the present invention.

In FIG. **4**, each principle step of the method of the video de-interlacing method of the present invention is numbered and enclosed inside a box. FIG. **5**, (comprising FIG. **5/1**, and FIG. **5/2** as continuation of FIG. **5/1**), shows a preferred illustrative embodiment for implementing the method shown in FIG. **4**, also as a flow diagram.

Referring to FIG. **4**, a preferred embodiment of a method of video de-interlacing of the present invention is as follows.

In Step 1, initialization is performed, in which the value of the first output pixel, evaluated by using the de-interlacing approximation method, is initialized. Additionally, threshold constants and pixel luminance (brightness and darkness) levels, to be used later in the decision step (Step 10) of assigning a value to a missing pixel, are defined.

In Step 2, there is identification of a horizontal line of missing spatial pixels within a current spatial field, at a given set time.

In Step 3, there is identification of the current horizontal line of temporal pixels with known values, located within the previous temporal field or the next temporal field, or alternatively, located within both the previous temporal field and next temporal field, corresponding to the same horizontal line of missing spatial pixels within the current spatial field determined in Step 2, at the given set time.

In Step 4, identification is made of a missing spatial pixel whose value is to be approximated, in the line of missing spatial pixels.

In Step 5, determination is made of directional averages of the known spatial pixel neighbors of the missing spatial pixel, in the current spatial field of the horizontal line of missing spatial pixels, at the given set time.

In Step 6, determination is made of averages of known temporal pixels, located in the previous temporal field or in the next temporal field, or alternatively, located in both the previous temporal field and in the next temporal field, in the same horizontal line and the same column of the missing spatial pixel.

In step 7, determination is made of standard deviations of known spatial pixels located in the current spatial field of the missing spatial pixel.

In Step 8, determination is made of the minimum standard deviation of the standard deviations determined in Step 7.

In Step 9, there is determination of the standard deviation between the average of neighbor temporal pixels evaluated in Step 6, and the average of current spatial pixels related to the minimum standard deviation evaluated in Step 8.

Step 10 is a decision step, deciding from several potential values to the missing spatial pixel, based on evaluation of a series of logical operations of previously determined values. The decision step concludes with assignment of a value to the missing spatial pixel.

In Step 11, the approximated value of the missing pixel determined in Step 10, is saved for initialization of, and in performing the following feedback step, Step 12, for approximating a value of a next missing spatial pixel, in the next cycle of the approximation method. Completion of Step 11, represents completion of a single cycle of approximating values of missing pixels in grid space, using a mixed mode spatial and temporal approximation technique of the present invention, of an interlaced format video signal, prior to transmission of a de-interlaced video signal to an electronic visual display device.

Step 12 continues the approximation method by approximation of a value of a next missing spatial pixel by feedback, by repeating Steps 1 through 11.

FIG. **5**, (comprising two pages as FIG. **5/1**, and FIG. **5/2** as continuation of FIG. **5/1**), shows a flow diagram of an exemplary preferred embodiment for implementing the video de-interlacing method shown in FIG. **4**. The preferred embodiment of FIG. **5** is an example of implementing the video de-interlacing method of the present invention for approximating the value of missing pixel P **46**, shown in FIG. **3**, included in a field of a sequence of an interlaced video signal. Principle step numbers and titles of FIG. **5/1** and of FIG. **5/2** correspond to those appearing in FIG. **4**. Notation and symbols appearing in FIG. **5/1** and in FIGS. **5/2** are consistent with those appearing in FIG. **3**. For each principle method step, definitions of selected terms or components of that step, or of a substep to that step, are included, in addition to one or more substeps representing further of the indicated principle method step of the video de-interlacing method. In the following description of preferred embodiment featured in FIG. **5/1** and FIG. **5/2**, definitions are indicated by a hyphen, substeps are indicated by a letter in parentheses, and the multiplication operation is indicated by an asterisk (*).

Referring to FIG. **5/1**, Step 1 starts the mixed mode spatio-temporal approximation de-interlacing method with initialization of the first output pixel, definition of threshold constants, and definition of pixel luminance levels. Step (a) is the initialization of the value of the first output pixel, of the approximation method of an interlaced sequence of a video signal of the present invention, such as that shown in FIG. **3** for example, whereby the output value of a previous pixel (Previous-Result) is set equal to zero, (Previous-Result)=0. Additionally in Step 1, threshold constants, A_i, for i=1 to 8, and pixel luminance levels, including B=a darkness level (black level), and W=a brightness level (white level), are each defined. Threshold constants and luminance levels are used later for completing a decision step, involving evaluation of a series of logical operations leading to assignment of a value to a missing pixel.

In Step 2 identification is made of a horizontal line of missing pixels within a current spatial field, at a given set time. Step (a) involves setting-up a matrix representation of pixels of a sequence of an interlaced video signal, featuring spatial and temporal pixels within spatial and temporal interlaced fields, at a given set (current) time. These interlaced fields are to be de-interlaced by the present approximation method. The example used in this embodiment of the

present invention relates to that appearing in FIG. **3**. There it is shown that missing spatial pixels are located in horizontal line **42**, in Line (k) **44**.

In Step 3, there is identification of the current horizontal line of pixels with known values, located in the previous temporal field (Field (Y_{t-1}) **34**, FIG. **3**), or in the next temporal field (Field (Y_{t+1}) **36**, FIG. **3**), or located in both the previous temporal field (Field (Y_{t-1}) **34**, FIG. **3**) and in the next temporal field (Field (Y_{t+1}) **36**, FIG. **3**), corresponding to the same location as the horizontal line of missing spatial pixels within the current spatial field determined in Step 2 (FIG. **5/1**) at the given set time. Successful implementation of the method of the present invention, requires input values of known pixels from at least one temporal field neighbor of the current spatial field featuring missing pixels. In step (a), reference is made to FIG. **3**, where temporal pixels, with values locate din Line (k) **44**, in the previous temporal Field (Y_{t-1}) **34**, have values g_1, g_2, g_3, and temporal pixels with values, locate din Line (k) **44**, in the next temporal Field (Y_{t+1}) **36**, have values h_1, h_2, h_3. Temporal pixels with known values, located in at least one of the neighboring previous temporal field, or next temporal field, are used as inputs in the approximation method of the present invention.

In Step 4, identification is made of a missing pixel in the line of missing pixels, whose value is to be approximated by the method of the present invention. In step (a), reference is made to FIG. **3**, where a missing spatial pixel P **46** location in Line (k) **44** of missing pixels, in spatial Field (Y_t) **32** is selected, as part of an example of implementation of the approximation method.

In Step 5, determination is made of directional averages of the known spatial pixel neighbors of the missing spatial pixel (P **46** in FIG. **3**), located in the current field of the horizontal line of missing spatial pixels, at the given set time. In step (a), neighbor pixel values are obtained from the matrix representation of pixels in grid space (FIG. **3**). Neighbor spatial pixels with values, located in Line (k−1) **38**, and in Line (k+1) **40**, in the current spatial Field (Y_t) **32** of the missing spatial pixel P **46**, have values x_1, x_2, x_3, and x_4, x_5, x_6, respectively. In step (b), the directional averages, m_i, are evaluated, where $m_1=a_1x_1+a_2x_6$, $m_2=b_1x_2+b_2x_5$, and $m_3=c_1x_3+c_2x_4$, with $a_1+a_2=1$, $b_1+b_2=1$, and $c_1+c_2=1$, where coefficients a_i, b_i, and c_i are positive constants.

In Step 6, determination is made of averages of values of known temporal pixels, located in the previous temporal field and in the next temporal field, in the same horizontal line and the same column of the missing spatial pixel (P **46** in FIG. **3**). In step (a), previous and next field pixel values are obtained from the matrix representation of pixels in grid space (FIG. **3**). Temporal pixels with values, located in Line (k) **44**, in the previous temporal Field (Y_{t-1}) **34**, have values g_1, g_2, and g_3, and temporal pixels with values, located in Line (k) **44**, in the next temporal Field (Y_{t+1}) **36** have values h_1, h_2, and h_3. In step (b), temporal pixel average, m_T, is evaluated, where $m_T=d_1g_2+d_2h_2$, with $d_1+d_2=1$, and where coefficients d_1 and d_2 are positive constants, greater than or equal to zero. In step (c), temporal pixel average, n_T, is evaluated, where $n_T=e_1g_1+e_2h_1$, with $e_1+e_2=1$, and where coefficients e_1 and e_2 are positive constants, greater than or equal to zero.

According to the values of the coefficients, d_1, d_2, e_1, and e_2, the approximation method of the present invention requires input values from three fields of pixels (one current spatial field and two neighboring temporal fields), or input values from two fields of pixels (one current spatial field and one neighboring temporal field), for approximating missing pixels in the current spatial field. In the case of $d_1=0$ and $e_1=0$, $m_T=d_2H_2$, and $n_T=e_2h_1$, temporal pixel values (h_1 and h_2) from only one temporal field, the next temporal field (Field (Y_{t+1}) **36**, FIG. **3**), are needed for evaluation of m_T and n_T, and ultimately evaluation of missing pixel P **46** (FIG. **3**). Similarly, in the case of $d_2=0$ and $e_2=0$, $m_T=d_1g_2$, and $n_T=e_1g_1$, temporal pixel values (g_1 and g_2) from only one temporal field, the previous temporal field (Field (Y_{t-1}) **34**, FIG. **3**) are needed for evaluation of m_T and n_T, and ultimately evaluation of missing pixel P **46** (FIG. **3**). In other cases, in which neither $d_1=0$ and $e_1=0$, or $d_2=0$ and $e_2=0$, occurs, then there is a known value of at least one temporal pixel from each of both neighboring temporal fields (Field (Y_{t+1}) **36** and Field (Y_{t-1}) **34**, FIG. **3**), to the current spatial field (Field (Y_t) **32**, FIG. **3**) featuring the missing spatial pixel (P **46**, FIG. **3**) to be approximated, in the equations for evaluating m_T and n_T, which are used in a later decision step (Step 10, FIG. **5/2**) leading to evaluation of the missing spatial pixel (P **46**, FIG. **3**).

Continuation of the exemplary preferred embodiment of FIG. **5**, appears in FIG. **5/2**, where in Step 7, determination is made of standard deviations of spatial pixels with known values, located in the current spatial field of the missing spatial pixel (P **46** in FIG. **3**). In step (a), standard deviations, Sigma i, are evaluated for i=1 to 3, where Sigma $1=s_1$[abs (x_1-m_1)], Sigma $2=s_2$[abs(x_2-m_2)], and Sigma $3=s_3$[abs (x_3-m_3)], where s_i(for i=1 to 3) is a positive constant, and the term 'abs' appearing in the equations of Sigma i=s_i[abs (x_i-m_i)], represents the absolute value of the term appearing in the parentheses, i.e., the absolute value of (x_i-m_1). The equation used for evaluating the standard deviation of Sigma i, i.e., Sigma i=s_i[abs(x_i-m_i)], is a known close approximation to the actual equation used for evaluating a standard deviation.

In Step 8, the minimum standard deviation of the standard deviations evaluated in Step 7 (FIG. **5/2**) is determined. Step (a) features evaluation of the minimum standard deviation, Min=Sigma, from the set of Sigma i(i=1 to 3), where Min-Sigma=Min [Sigma i] for 1<=i<=3, and Min is a minimization operator. The term, m_j(where j=i) is defined as the average of spatial pixel values related to the minimum standard deviation, Min-Sigma.

In Step 9, there is determination of the standard deviation between the average of neighbor temporal pixels evaluated in Step 6 (FIG. **5/1**), and the average of current spatial pixels related to the minimum standard deviation evaluated in Step 8 (FIG. **5/2**). Step (a) features evaluation of the standard deviation, Sigma, where Sigma=[abs(m_T-m_j)], and where m_T and m_j correspond to the average of neighbor temporal pixels evaluated in Step 6 (FIG. **5/1**), and the average of current spatial pixels related to the minimum standard deviation evaluated in Step 8 (FIG. **5/2**), respectively.

Step 10 is a decision step, in which a series of logical operations are evaluated leading to decision and assignment of a value to the missing spatial pixel (P **46** in FIG. **3**). The decision step concludes with assignment of a value to the missing spatial pixel.

In step (a), there is evaluation of a series of logical operations [listed as (i) through (x) in the preferred embodiment of the present invention shown in FIG. **5/2**] featuring comparisons of: linear combinations of a standard deviation (Sigma, or Min-Sigma); or of absolute magnitude of the difference between temporal pixel average, m_T, and a selected spatial pixel with a known value (x_1, x_2, x_3, x_4, x_5 or x_6); or of an average (m_T); or of the difference between

a previously approximated missing pixel value (Previous-Result) and an average of temporal pixels (n_T); to linear combinations of threshold constants (A_1 through A_8) or pixel luminance levels (B, W), previously defined in Step 1 (FIG. **5/1**). The series of logical comparisons features the following, whereby, if any one of the following logical operations [(i) through (x)] is correct, then the decision is to assign (Step (b)) a value to the missing spatial pixel (P **46** in FIG. **3**):

(i) Sigma<=(K0+Min-Sigma), where $—C_0<=K0<C_0$, or (ii) Min-Sigma >=(W−K1), where $—C_1<=K1<C_1$, or (iii) abs (m_T-x_1)<A1, or (iv) abs (m_T-x_2)<A2, or (v) abs (m_T-x_3)<A3, or (vi) abs (m_T-x_4)<A4, or (vii) abs (m_T-x_5)<A5, or (viii) abs (m_T-x_6)<A6, or (ix) m_T<=(B+K2), where $—C_2$<=K2 <C_2, or (x) [(Previous-Result)−n_T<=A6] and [m_T>=W−A7], whereby the following additional logical comparison is evaluated, to assign a value to the missing spatial pixel (P **46** in FIG. **3**): If Sigma<A8, the value of the missing spatial pixel (P **46** in FIG. **3**) is assigned (Step (b)) as: P=(m_T+m_j)*K3, where 0<K3<1. However, if Sigma>= A8, the value of the missing spatial pixel (P **46** in FIG. **3**) is assigned (Step (b)) as: P=m_T.

If none of the logical comparisons (i) through (x) is correct, then the decision is to assign (Step (b)) the value of missing spatial pixel (P **46** in FIG. **3**) as: P=m_j.

In Step 10, the assigned value of missing spatial pixel (P 46 in FIG. **3**) is obtained, in part, from input of known values of pixels located in either one, or two neighbor temporal fields (Field (Y_{t-1}) **36** and Field (Y_{t-1}) **34**, FIG. **3**), in addition to input of known values of pixels located in the current spatial field (Field (Y_t) **32**, FIG. **3**) featuring the missing spatial pixel (P **46**, FIG. **3**) to be approximated. As described in Step 6 (FIG. **5/1**), and shown by the logical operations (equations) of Step)10, for the case in which the coefficients d_1=0 and e_1=0, then $m_T=d_2h_2$, and $n_T=e_2h_1$, or, for the case in which the coefficients d_2=0 and e_2=0, then $m_T=d_1g_2$, and $n_T=e_1g_1$, then the value of missing pixel P **46** (FIG. **3**) is obtained using known values of pixels of only one neighbor temporal field, i.e., Field (Y_{t+1}) **36**, or Field (Y_{t-1}) **34**, and of the current spatial field, Field (Y_t) **32** featuring the missing pixel P **46**, as shown in FIG. **3**.

In Step 11, the approximated value of the missing pixel determined in Step 10, is saved for initialization of, and in performing the following feedback step, Step 12, for approximating a value of a next missing spatial pixel, in the next cycle of the approximation method. Completion of Step 11, represents completion of a single cycle of approximating values of missing pixels in grid space, using a mixed mode spatial and temporal approximation technique of the present invention, of an interlaced format video signal, prior to transmission of the de-interlaced video signal to an electronic visual display device.

In Step 12, continues the approximation method of the present invention, by approximation of a value of a next missing spatial pixel by feedback of (Previous-Result) from Step 11, and repeating Steps 1 through 11.

The method of the present invention, may be similarly implemented for the case of video interlaced RGB signals, whereby the above method (Steps 1 through 11, FIG. **5/1** and FIG. **5/2**) is repeated for each color component (red, green, and blue).

The method of the present invention, may be similarly implemented for the case of video interlaced signals represented by luminance and chrominance components (for example, YUV, YCrCb), whereby the above method (Steps 1 through 11, FIG. **5/1** and FIG. **5/2**) is repeated only for the luminance components (the Y part), and an approximation is performed for the chrominance components (the CrCb part), from information obtained from the decision step (Step 10).

While the invention has been described with respect to one embodiment, it will be appreciated that many variations, modifications and other applications of the invention may be made.

What is claimed is:

1. A method for de-interlacing an interlaced video format, the method comprising the steps of:

(a) receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced;

(b) using a current spatial field featuring missing spatial pixels and said spatial pixels with known values, locate din said sequence of said fields, and at least one temporal field featuring temporal pixels with known values, located in said sequence of said fields, for determining values of said missing pixels of said current spatial field; and

(c) feedback of said values of said missing pixels of said current spatial field for determination of next said missing pixels of said current spatial field.

2. The method of claim **1**, wherein said at least one temporal field featuring said temporal pixels with said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields.

3. The method of claim **1**, further comprising the steps of:

(c) evaluating logical operations of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of said temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor'; and

(d) deciding upon assignment of said values to said missing spatial pixels according to results of said logical operations.

4. The method of claim **3**, wherein said plurality of constants is selected from the group consisting of a linear combination of a plurality of values of threshold constants, and a linear combination of a plurality of values of luminance levels of said missing pixels.

5. The method of claim **4**, wherein said plurality of said values of said luminance levels of said missing pixels includes a plurality of values of darkness and a plurality of values of brightness.

6. The method of claim **1**, wherein said assigned values to said missing pixels feature linear combinations of averages of said pixels with said known value.

7. A method for de-interlacing an interlaced video format, the method comprising the steps of:

(a) receiving the interlaced video format feature a sequence of fields of pixels to be de-interlaced;

(b) evaluating logical operations of linear combinations of values selected from the group consisting of averages

of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor'; and

(c) deciding upon assignment of values to missing spatial pixels according to results of said logical operations.

8. The method of claim **7**, wherein said sequence of fields of pixels to be de-interlaced features a current spatial field featuring missing spatial pixels and said spatial pixels with known values located in said sequence of aid fields, and at least one temporal field featuring said temporal pixels with said known values located in said sequence of said fields.

9. The method of claim **8**, wherein said at least one temporal field featuring said temporal pixels with said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields.

10. The method of claim **7**, wherein said plurality of constants is selected from the group consisting of a linear combination of a plurality of values of threshold constants, and a linear combination of a plurality of values of luminance levels of said missing pixels.

11. The method of claim **10**, wherein said plurality of said values of said luminance levels of said missing pixels includes a plurality of values of darkness and a plurality of values of brightness.

12. The method of claim **7**, wherein said assigned values to said missing pixels feature said linear combinations of said averages of said pixels with said known values.

13. The method of claim **7**, further comprising the step of:

(d) feedback of said values of said missing pixels of said current spatial field for determination of next said missing pixels of said current spatial field.

14. A method for de-interlacing an interlaced video format, the method comprising the steps of:

(a) receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced;

(b) using a current spatial field featuring missing spatial pixels and said spatial pixels with known values, located in said sequence of said fields, and one temporal field featuring temporal pixels with known values, located in said sequence of said fields, for determining values of said missing pixels of said current spatial field;

(c) evaluating logical operations of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of said temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor'; and

(d) deciding upon assignment of said values to said missing spatial pixels according to results of said logical operations.

15. The method of claim **14**, wherein said one temporal field featuring said temporal pixels with said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields.

16. The method of claim **14**, wherein said plurality of constants is selected from the group consisting of a linear combination of a plurality of values of threshold constants, and a linear combination of a plurality of values of luminance levels of said missing pixels.

17. The method of claim **16**, wherein said plurality of said values of said luminance levels of said missing pixels includes a plurality of values of darkness and a plurality of values of brightness.

18. The method of claim **14**, wherein said assigned values to said missing pixels feature linear combinations of averages of said pixels with said known values.

19. The method of claim **14**, further comprising the step of:

(c) feedback of said values of said missing pixels of said current spatial field for determination of next said missing pixels of said current spatial field.

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(54) **METHOD FOR DETERMINING ENTROPY OF A PIXEL OF A REAL TIME STREAMING DIGITAL VIDEO IMAGE SIGNAL, AND APPLICATIONS THEREOF**

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See application file for complete search history.

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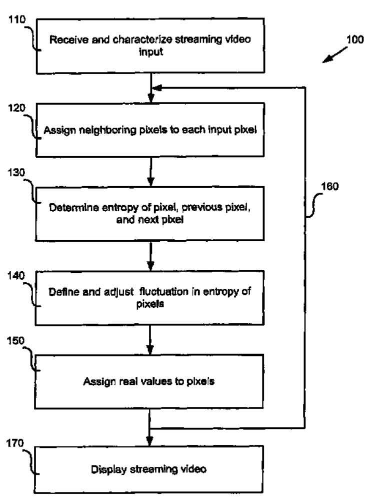
(57) **ABSTRACT**

Method for determining entropy of a pixel of a real time streaming digital video image signal, particularly applicable for identifying the origin of, and processing, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, and for correcting errors produced during editing of streaming digital video image signals. Based upon the fundamental aspect of determining the degree or extent of randomness or disorder, or entropy, and determining the fluctuation thereof, of each pixel relative to inter-local neighborhoods and intra-local neighborhoods of selected pixels originating from the streaming digital video image input signal. Automatically detects and identifies original mode of the video input signal (film movie, video camera, or graphics). Independent of type of mode conversion used for generating the original video input signal, and not based upon an 'a priori' type of pattern recognition method.

80 Claims, 1 Drawing Sheet



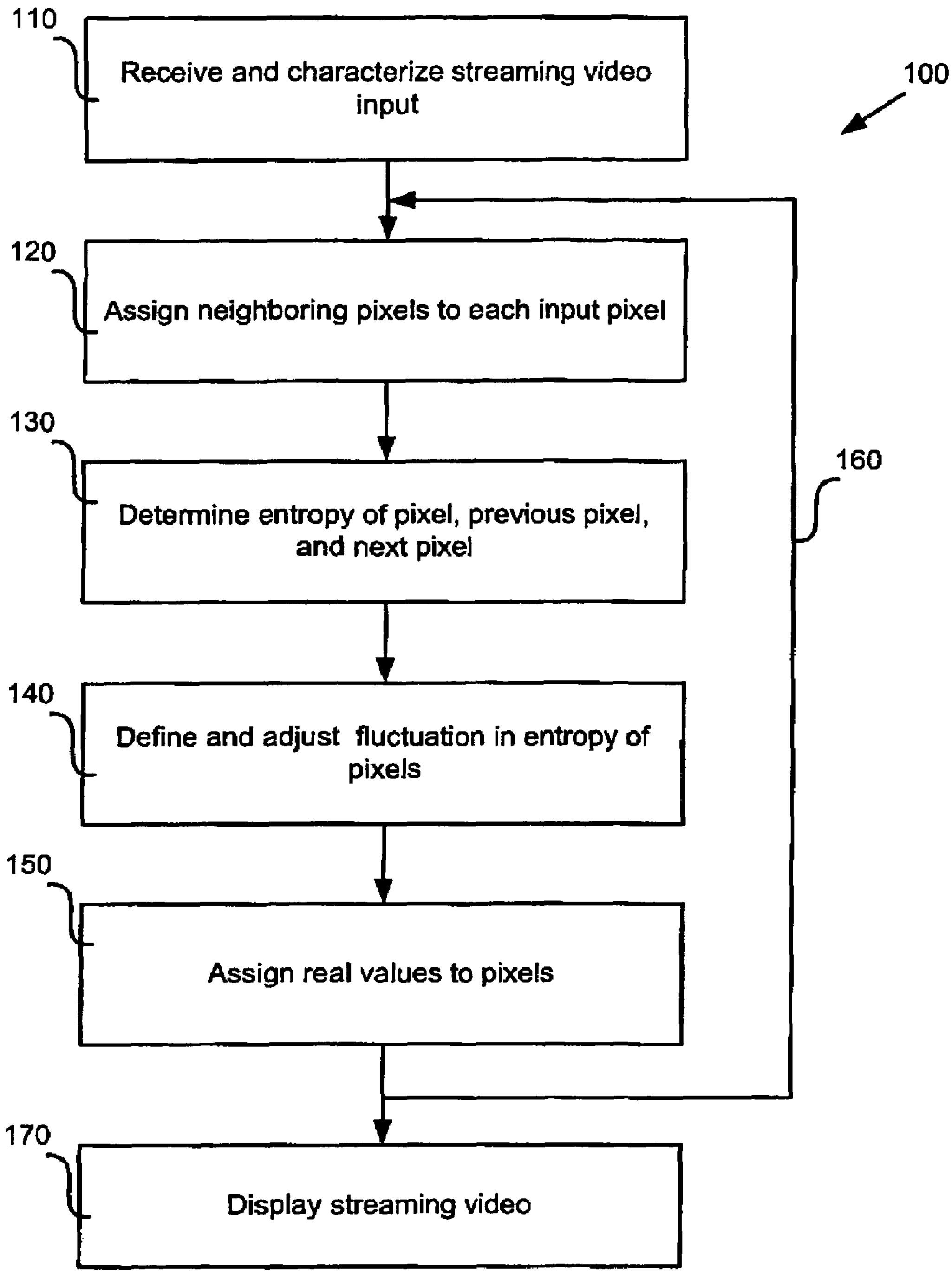

110
Receive and characterize streaming video input
100
120
Assign neighboring pixels to each input pixel
130
Determine entropy of pixel, previous pixel, and next pixel
160
140
Define and adjust fluctuation in entropy of pixels
150
Assign real values to pixels
170
Display streaming video

Fig. 1

METHOD FOR DETERMINING ENTROPY OF A PIXEL OF A REAL TIME STREAMING DIGITAL VIDEO IMAGE SIGNAL, AND APPLICATIONS THEREOF

This claims the benefit of priority of U.S. Provisional Patent Application No. 60/330,785, filed Oct. 31, 2001, entitled: "Method For Determining Entropy Of A Pixel Of A Real time Digital Video Stream Signal, And Applications Thereof".

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to the field of processing and analyzing streaming digital video image signals and, more particularly, to a method for determining entropy of a pixel of a real time streaming digital video signal. The method of the present invention is particularly applicable for identifying the origin of, and processing, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, and for correcting errors produced during editing of streaming digital video image signals.

A streaming digital video image signal is represented as continuous sequences of either fields, according to an interlaced scan refresh format, or frames, according to a non-interlaced or progressive scan refresh format. In the interlaced scan format, a digital video image signal in the form of a single image (frame) is represented using a pair of fields. One field of the pair features pixels located in alternate horizontal lines (rows), for example, odd numbered horizontal lines, of the field matrix. The second field of the pair features pixels located in the same field matrix only in the corresponding horizontal lines, for example, even numbered horizontal lines, which are missing pixels in the first field, such that portions of the image not represented in the first field are thereby represented in the second field. In the interlaced scan format, each field of image data is scanned twice, once for the odd numbered horizontal lines of the field, and another time for the even numbered horizontal lines of the field, in order to have all of the horizontal lines of the odd field followed by all of the horizontal lines of the even field. The pair of fields of odd and even horizontal lines in interlaced video constitute the frame (one full resolution picture or image). By contrast, in the non-interlaced or progressive scan format, a digital video image signal is represented in its entirety using only a single field which includes pixels in all horizontal lines of the field matrix. Here, each frame or field of image data is scanned once from the top horizontal line to the bottom horizontal line without requiring interlacing action between two fields.

In an interlaced scan format, the first and second fields of a pair are scanned consecutively on a video display monitor at a pre-determined rate of a number of, for example, 60, fields per second, in order to reconstruct single image frames on the display at a standard broadcasting interlaced scan rate of a number of, for example, 30, frames per second. In more recently developed video representation techniques, such as non-interlaced or progressive scan format, frames are progressively scanned on a display at a standard progressive display rate of 60 frames per second.

Application of current interlaced scan format to television is typically according to the NTSC (National Television System Committee) standard format, or, according to the PAL (Phase Alternation by Line) standard format. In the NTSC format, there are 262.5 horizontal scanning lines per field (including one odd numbered field, and one even numbered field), translating to 525 scanning lines per frame, with an established scan rate of (60 fields) 30 frames per second. In the PAL format, there are 312.5 horizontal scanning lines per field (including one odd numbered field, and one even numbered field), translating to 625 scanning lines per frame, with an established scan rate of (50 fields) 25 frames per second.

Currently, regular video broadcasting by systems using NTSA, PAL, or, SECAM, types of standard formats, often incorporates a mixing of video image signals acquired by more than one type of video camera source, such as various combinations of interlaced video, non-interlaced or progressive video, non-interlaced Hollywood movie film, and, non-interlaced computer graphics, camera sources. If the camera source acquires image signals according to a non-interlaced or progressive type format and the broadcasting is of an interlaced type format, image signals acquired by the non-interlaced or progressive camera source need to be converted into an interlaced type format. Alternatively, if the broadcasting is of a non-interlaced or progressive type format, such as an HDTV progressive type format, and the digital video image signal display is of an interlaced type format, here, the broadcast video image signals need to be converted into an interlaced type format for proper display.

Currently, in most broadcasting systems, non-interlaced or progressive image sources are converted into interlaced formats to match the broadcasting interlaced format. However, if the broadcasting is of an interlaced type format, of a mix of originally interlaced video image signals, of interlaced originally non-interlaced video images, and of interlaced originally progressive video image signals, and the digital video image signal display is of a non-interlaced or progressive type format, here, the broadcast interlaced digital video image signals need to be de-interlaced into a non-interlaced or progressive type format.

New high quality, high resolution, TV display systems and devices, such as CRT PC monitors, high definition television (HDTV) desktop or workstation display monitors, flat liquid crystal device (LCD) panels, plasma display panels (PDP), home theater projectors, and video equipment, operate according to non-interlaced progressive high resolution scan format, such as VGA(480 lines×640 columns per frame), SVGA(600 lines×800 columns per frame), XGA(768 lines×1024 columns per frame), and UXGA(1200 lines×1600 columns per frame) to scan and display digital video images. An example showing application of de-interlacing interlaced digital video image signals involves the use of a typical LCD display having 480 horizontal scanning lines with 640 dots per scanning line (VGA system). Since LCD display systems are designed to scan according to a non-interlaced progressive format, in order to display NTSC (525 lines per frame) or PAL (625 lines per frame) digital video image signals on the LCD display, interlaced digital video image signals need to be converted into de-interlaced digital video image signals for proper display on the LCD.

In order to properly convert broadcast digital video image signals into appropriately corresponding interlaced or progressive digital video image signal display formats, there is a need for real time identifying the original mode or type of camera source of the digital video image signals. There are various prior art teachings of methods, device, and systems, for identifying the original mode or type of camera source of digital video image signals.

In U.S. Pat. No. 4,982,280, issued to Lyon et al., there is disclosed a motion sequence pattern detector which automatically detects a periodic pattern of motion sequences within a succession of fields of video image signals, char-

acterized by film mode or progressive scan mode, thereby indicating that a particular sequence originated from cinematographic film, or, from a progressive scan camera. Therein is particularly described a three-to-two (3:2) film to video sequence mode detector which automatically detects the presence of sequences of a video stream originating from transfer from cinematographic film according to a 3:2 pull down conversion performed during the transfer. The invention disclosed by Lyon et al. also includes a resynchronization procedure for automatically resynchronizing to film mode when a video splice in video originating with film occurs on a boundary other than a 3:2 pull down conversion field boundary.

The motion sequence pattern detector of Lyon et al. is based on using a pixel displacement circuit for detecting displacement of a pixel within successive video frames for each field of the video sequence and having a motion signal output indicative of displacement due to the unique properties attributable to the video sequence. Accordingly, the teachings of Lyon et al. focus and entirely depend upon, and are therefore limited to, using a process of pattern recognition, in general, and pattern recognition of motion sequences, in particular, among sequences of fields in a streaming video signal.

In U.S. Pat. No. 5,291,280, issued to Faroudja et al., there are disclosed techniques for motion detection between even and odd fields within 2:1 interlaced conversion television standard. Therein is described a field motion detector for use within a 2:1 interlaced temporal video signal stream in conjunction with a frame motion detector operating upon the same signal stream, in order to identify motion on a field by field basis. Similar to operation of the motion sequence pattern detector disclosed by Lyon et al., the teachings of Faroudja et al. focus and entirely depend upon, and are therefore limited to, using a process of pattern recognition, in general, and, pattern recognition of motion sequences, in particular, among sequences of fields in a streaming video signal.

In U.S. Pat. No. 5,452,011, issued to Martin et al., there is disclosed a method and apparatus for determining if a streaming video signal has characteristics of a signal originating from an interlaced video mode, or, has characteristics of a signal originating from a non-interlaced film mode. The teachings of Martin et al. are based upon, and limited to, evaluating 'accumulated', not 'individual', differences of pixels of two fields in successive frames of the video signal, and comparing the accumulated differences to threshold values, for making decisions regarding further processing of the video signal.

In U.S. Pat. No. 4,967,271, issued to Campbell et al., there is disclosed a television scan line doubler, for increasing the number of apparent scan lines of a display device, including a temporal median filter for pixel interpolation and a frame-by-frame based motion detector. The invention is based on methods of interpolation and use of an interpolator unit.

In Japanese Patent Application Publication No. 00341648 JP, published Dec. 08, 2000, of Japanese Patent Application No. 11145233, filed May 25, 1999, of applicant Pioneer Electronic Corp., there is disclosed a video signal converting and mode detector device for speedily identifying whether or not an input video signal is a telecine-converted video signal from a projection or movie film, or, the video signal of a standard television system, on the basis of respective correlation values between an interpolation field and fields before and after one field period. A motion detector detects the motion of an image and a scan line interpolator performs scan line interpolating processing corresponding to detection outputs from a mode detector and the motion detector.

In the publication, *Transactions On Consumer Electronics,* August 1999, by Schu, M. et al., of Infineon Technologies AG, Munich, Germany, there is described a "System On Silicon—IC For Motion Compensated Scan Rate Conversion, Picture-In-Picture processing, Split Screen Applications And display Processing", including the use of a method for "3-D-predictive motion estimation". The described 3-D predictive motion estimation algorithm uses vector information of previously calculated blocks (fields) in advance to calculate the motion vector for the actual block (field). The source vectors are taken from the same temporal plane (spatial components) and the previous temporal plane (temporal components) and used as prediction. Combinations of these predictors and a zero-vector are used for building a set of candidate vectors for the actual block (field). The block (field) positions pointed to by these candidates are evaluated by comparison criteria, in particular, using Summed Absolute Difference (SAD) criteria, where the absolute difference between the blocks (fields) is summed pixel by pixel. The best match is chosen and its assigned vector is taken as predictor for the next blocks (fields) and for use in the scan rate conversion.

Application and suitability of any of these particular techniques for identifying the original mode or type of camera source of digital video image signals strongly depends on the resulting video image quality. Moreover, success in applying a particular mode or motion identification technique varies with overall system operating conditions, and/or, with specific video image signal processing conditions.

Due to the fact that TV station and video broadcasting systems are increasingly broadcasting various mixes of video image signals acquired by a variety of video camera sources such as interlaced video, non-interlaced or progressive video, non-interlaced Hollywood movie film, and non-interlaced computer graphics, camera sources, operating according to different formats, coupled with the continued widespread usage of interlaced format TV display devices and systems, along with increasing appearance and usage of progressive TV display devices and systems, there is a significant on-going need for developing new approaches and techniques which are applicable for real time identifying the original mode or type of camera source of digital video image signals, in order to properly convert the broadcast digital video image signals into an interlaced or progressive format corresponding to the digital video image signal display format. Moreover, there is a corresponding on-going need for developing new approaches and techniques which are applicable for real time correcting errors produced during editing of the digital video image signals.

There is thus a need for, and it would be highly advantageous to have a method for determining entropy of a pixel of a real time streaming digital video image signal, which is particularly applicable for identifying the origin of, and processing, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, and for correcting errors produced during editing of streaming digital video image signals.

Moreover, there is a need for such an invention for analyzing and processing fields of pixels of a streaming digital video image signal which (1) is independent of the type of the mode conversion used for generating the original streaming digital video image input signal, for example, a 3:2 or 2:2 pull down mode conversion method for converting film movies appropriate for a DVD disk player operating

with a video NTSC or PAL format, and (2) is not based upon known methods or techniques involving 'a priori' pattern recognition based upon known methods or techniques involving evaluation of sets of 'accumulated' or 'summed' differences, instead of 'individual' differences, of pixel values located in successive fields of the streaming digital video image signal.

SUMMARY OF THE INVENTION

The present invention relates to a method for determining entropy of a pixel of a real time streaming digital video image signal. The method of the present invention is particularly applicable for identifying the origin of, and processing, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, and for correcting errors produced during editing of streaming digital video image signals.

The method of the present invention is based upon determining the degree or extent of randomness or disorder, herein, referred to as the entropy, and determining the fluctuation thereof, herein, referred to as the entropy fluctuation, of each pixel relative to inter-local neighborhoods and intra-local neighborhoods of pluralities of selected pixels originating from the streaming digital video image signal. This fundamental aspect of 'pixel entropy', for characterizing the degree or extent of randomness or disorder, and fluctuation thereof, of a single pixel based on its surrounding local neighborhood, of a streaming digital video image signal, enables one to efficiently determine appropriate further processing of the pixels of the streaming digital video image signal. The method features a sequence of unique and inventive steps and sub-steps for determining the entropy, and fluctuation thereof, of each individual pixel of a plurality of pixels of a streaming digital video image signal.

The present invention successfully meets the on-going need for developing new approaches and techniques in the electronics industry, in the field of processing and analyzing streaming digital video image signals which are applicable for identifying the original mode of streaming digital video image signals and correcting errors produced during editing of the streaming digital video image signals.

Thus, according to the present invention, there is provided a method for determining entropy of a pixel of a real time streaming digital video image signal, comprising the steps of: (a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval; (b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, the three consecutive fields being a previous field, a next field, and a current field; and (c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in the temporal interlaced sequence of the three consecutive fields, relative to the assigned and characterized local neighborhoods of the neighboring pixels, the determining comprising the steps of: (i) calculating values of pixel inter-local neighborhood parameters for each previous pixel in the previous field, and for each next pixel in the next field, whereby each value of each pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between the neighboring pixels located in subsets of the assigned and characterized local neighborhood of

each virtual pixel in the current field, and the assigned and characterized local neighborhood of each previous pixel in the previous field, and of each next pixel, in the next field, respectively; (ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each virtual pixel in the current field; (iii) adjusting a value of a pixel entropy counter for each previous pixel in the previous field, for each next pixel in the next field, and for each virtual pixel in the current field; and (iv) calculating a value of the entropy of each previous pixel in the previous field, of each next pixel in the next field, and of each virtual pixel in the current field, from the values of the pixel entropy counters of the pixels.

According to another aspect of the present invention, there is provided a method determining entropy of a pixel of a real time streaming digital video image signal, for automatically detecting the nature of a video source, by identifying original mode of the real time streaming digital video image input signal, comprising the steps of: (a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval; (b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, the three consecutive fields being a previous field, a next field, and a current field; and (c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in the temporal interlaced sequence of the three consecutive fields, relative to the assigned and characterized local neighborhoods of the neighboring pixels, the determining comprising the steps of: (i) calculating values of pixel inter-local neighborhood parameters for each previous pixel in the previous field, and for each next pixel in the next field, whereby each value of each pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between the neighboring pixels located in subsets of the assigned and characterized local neighborhood of each virtual pixel in the current field, and the assigned and characterized local neighborhood of each previous pixel in the previous field, and of each next pixel, in the next field, respectively; (ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each virtual pixel in the current field; (iii) adjusting a value of a pixel entropy counter for each previous pixel in the previous field, for each next pixel in the next field, and for each virtual pixel in the current field; (iv) calculating a value of the entropy of each previous pixel in the previous field, of each next pixel in the next field, and of each virtual pixel in the current field, from the values of the pixel entropy counters of the pixels; (d) defining and adjusting a value of fluctuation of the value of the entropy of each virtual pixel in the current field in the global input grid of the pixels included in the streaming digital video input image signal, thereby further characterizing the value of the entropy of each virtual pixel in the current field; and (e) assigning a real value to each virtual pixel in the current field in the global input grid of the pixels in the streaming digital video input image signal, whereby the real values of the virtual pixels in the streaming digital video input image signal correspond to identification of the original mode of the real time streaming digital video image input signal.

According to another aspect of the present invention, there is provided a method determining entropy of a pixel of a real time streaming digital video image signal, for automatically correcting an error produced during real time editing of the real time streaming digital video image input

signal, comprising the steps of: (a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval; (b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, the three consecutive fields being a previous field, a next field, and a current field; and (c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in the temporal interlaced sequence of the three consecutive fields, relative to the assigned and characterized local neighborhoods of the neighboring pixels, the determining comprising the steps of: (i) calculating values of pixel inter-local neighborhood parameters for each previous pixel in the previous field, and for each next pixel in the next field, whereby each value of each pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between the neighboring pixels located in subsets of the assigned and characterized local neighborhood of each virtual pixel in the current field, and the assigned and characterized local neighborhood of each previous pixel in the previous field, and of each next pixel, in the next field, respectively; (ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each virtual pixel in the current field; (iii) adjusting a value of a pixel entropy counter for each previous pixel in the previous field, for each next pixel in the next field, and for each virtual pixel in the current field; and (iv) calculating a value of the entropy of each previous pixel in the previous field, of each next pixel in the next field, and of each virtual pixel in the current field, from the values of the pixel entropy counters of the pixels, whereby the values of the entropy of each previous pixel in the previous field, of each next pixel in the next field, and of each virtual pixel in the current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a previous pixel in the previous field, and value of a next pixel in the next field, for assigning a real value to the virtual pixel in the current field in the global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.

Implementation of the method of the present invention involves performing or completing selected tasks or steps manually, semi-automatically, fully automatically, and/or, a combination thereof. Moreover, according to actual instrumentation and/or equipment used for implementing a particular preferred embodiment of the disclosed method, several selected steps of the present invention could be performed by hardware, by software on any operating system of any firmware, or a combination thereof. In particular, as hardware, selected steps of the invention could be performed by a computerized network, a computer, a computer chip, an electronic circuit, hard-wired circuitry, or a combination thereof, involving a plurality of digital and/or analog, electrical and/or electronic, components, operations, and protocols. Additionally, or alternatively, as software, selected steps of the invention could be performed by a data processor, such as a computing platform, executing a plurality of computer program types of software instructions or protocols using any suitable computer operating system.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawing illustrates one or more implementations consistent with the principles of the invention and, together with the description, explain such implementations. In the drawing,

FIG. **1** illustrates an exemplary process of determining entropy of a pixel of a real time streaming digital video image signal.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to a method for determining entropy of a pixel of a real time streaming digital video image signal. The method of the present invention is particularly applicable for identifying the origin of, and processing, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, and for correcting errors produced during editing of streaming digital video image signals.

A main aspect of novelty and inventiveness of the method of the present invention is based upon determining the degree or extent of randomness or disorder, herein, referred to as the entropy, and determining the fluctuation thereof, herein, referred to as the entropy fluctuation, of each pixel relative to inter-local neighborhoods and intra-local neighborhoods of pluralities of selected pixels originating from the streaming digital video image signal. This fundamental aspect of 'pixel entropy', for characterizing the degree or extent of randomness or disorder, and fluctuation thereof, of a single pixel based on its surrounding local neighborhood, of a streaming digital video image signal, enables one to efficiently determine appropriate further processing of the pixels of the streaming digital video image signal. The method features a sequence of unique and inventive steps and sub-steps for determining the entropy, and fluctuation thereof, of each individual pixel of a plurality of pixels of a streaming digital video image signal.

The method of the present invention for analyzing and processing fields of pixels of a streaming digital video image signal, in general, and for determining entropy of a pixel of a real time streaming digital video image signal, in particular, (1) is independent of the type of the mode conversion used for generating the original streaming digital video image input signal, for example, a 3:2 or 2:2 pull down mode conversion method for converting film movies appropriate for a DVD disk player operating with a video NTSC or PAL format, and (2) is not based upon known methods or techniques involving 'a priori' pattern recognition based upon known methods or techniques involving evaluation of sets of 'accumulated' or 'summed' differences, instead of 'individual' differences, of pixel values located in successive fields of the streaming digital video image signal.

Based upon the above indicated main aspect of novelty and inventiveness, and advantages, the present invention successfully widens the scope of presently known techniques and methods in the electronics industry, in the field of processing and analyzing streaming digital video image signals which are applicable for identifying the original mode of streaming digital video image signals and correcting errors produced during editing of the streaming digital video image signals. Moreover, the present invention is readily commerically applicable.

It is to be understood that the invention is not limited in its application to the details of the order or sequence of steps of operation or implementation, set forth in the following

description. For example, the following description refers to two commonly used non-interlaced film or progressive video to interlaced video scan rate conversions, a 3:2 pull down scan rate conversion and a 2:2 pull down scan rate conversion, in order to illustrate implementation of the present invention. The invention is capable of other embodiments or of being practiced or carried out in various ways, such as by applying different types of non-interlaced film or progressive video to interlaced video scan rate conversions. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

It is also to be understood that unless otherwise defined, all technical and scientific words, terms, and/or phrases, used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Phraseology, terminology, and, notation, employed herein are for the purpose of description and should not be regarded as limiting.

Steps and implementation of a method for determining entropy of a pixel of a real time streaming digital video image signal, particularly applicable for identifying the origin of, and processing, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals such as film mode video signals or progressive video signals or computer animation video signals, and for correcting errors produced during editing of streaming digital video image signals, according to the present invention are better understood with reference to the following description.

As previously stated above, currently, regular video broadcasting by systems using NTSA, PAL, or, SECAM, types of standard formats, often incorporates a mixing of video image signals acquired by more than one type of video camera source, such as various combinations of interlaced video, non-interlaced or progressive video, non-interlaced Hollywood movie film, and, non-interlaced computer graphics, camera sources. If the camera source acquires image signals according to a non-interlaced or progressive type format and the broadcasting is of an interlaced type format, image signals acquired by the non-interlaced or progressive camera source need to be converted into an interlaced type format. Alternatively, if the broadcasting is of a non-interlaced or progressive type format, such as an HDTV progressive type format, and the digital video image signal display is of an interlaced type format, here, the broadcast video image signals need to be converted into an interlaced type format for proper display.

In order to better understand implementation of the method of the present invention, two commonly used procedures for scan rate conversion of non-interlaced film or progressive video formats into interlaced formats of broadcasting video are described herein. The type of scan rate conversion usually involves two main parameters: (1) the number of input frames, and, (2) the number of output fields, that is, the type of interlaced video format, for example, NTSC, PAL, or, SECAM. The first commonly used scan rate conversion is the 3:2 pull down conversion, for converting 24/25 input frames per second of non-interlaced film source into 60 fields per second of NTSC interlaced video format. The second commonly used scan rate conversion is the 2:2 pull down conversion, for converting 24/25 input frames per second of non-interlaced film source into 50 fields per second of PAL interlaced video format. The method of the present invention is suitable to other types of scan rate conversions of non-interlaced film or progressive video formats to interlaced video formats.

In the 3:2 pull down scan rate conversion, non-interlaced film of 24 frames is converted to NTSC interlaced video format as follows. Each sequential odd (or, even) frame is converted into three fields of even, odd, and even, fields, where the even fields feature the same even lines of the original frame and the odd field features the same odd lines of the original frame. Each sequential even frame is converted into two fields, where the even field features the even lines of the original frame and the odd field features the odd lines of the original frame, thus, producing 60 fields per second (60 Hz).

In the 2:2 pull down scan rate conversion, non-interlaced film of 24 frames per second is converted to 50 fields per second of PAL interlaced video format as follows. In case (a), each sequential frame is converted into two fields, an odd and an even field, where the odd field features the odd horizontal lines of the original frame and the even field features the even horizontal lines of the original frame, thus, generating 48 fields per second (48 Hz) instead of 50 fields per second (50 Hz). In case (b), each sequential frame is converted into two fields as described above for case (a), except that sequential frames of order k*12, for k=1, 2, 3, 4, . . . , in the film sequence are converted into three fields in the same manner as for the 3:2 pull down conversion, thus, generating 50 fields per second (50 Hz). In case (c), if the film is of 25 frames per second, then the conversion is performed according to case (a), thus, generating 50 fields per second (50 Hz).

FIG. **1** illustrates an exemplary process **100** of determining entropy of a pixel of a real time streaming digital video image signal. In Step (a) (act **110**) of the method for determining entropy of a pixel of a real time streaming digital video image signal, of the present invention, there is receiving and characterizing the streaming digital video image input signal during a pre-determined time interval.

More specifically, there is receiving a streaming digital video input image signal, I, during a pre-determined time interval, herein, generally referred to as Δt, featuring a plurality of input image signal pixels, I(i,j), which can be plotted in a global input grid of a digital video image signal processing device, whose position coordinates in the global input grid are indicated by horizontal line (row) i, and vertical column j. For the streaming digital video input image signal, I, of size R horizontal lines (rows) by C vertical columns, position indices (i,j) are preferably limited to the size of the streaming digital video input image signal, I, as follows: i: 0, 1, 2, . . . R−1; and j: 0, 1, 2, . . . C−1. In general, indices i and j are real or integer.

Implementation of the method of the present invention is 'independent' of the type of the mode conversion used for generating the streaming digital video image input signal. For example, a 3:2, 2:2, or other, pull down mode conversion method for converting film movies appropriate for a DVD disk player operating with a video NTSC or PAL format, is used for providing the streaming digital video image input signal, I, in the method of the present invention.

In Step (b) (act **120**), there is assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel, I (i,j), of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields, in the global input grid of pixels featured in the streaming digital video input image signal, I.

The streaming digital video input image signal, I, consists of a continuous sequence of fields, F, where each field contains half of the entire number of horizontal lines of an image frame as displayed on a TV screen. Accordingly, such a sequence is an interlaced sequence, where each field in the

sequence contains either odd or even horizontal lines. There is defining F(t−1), F(t), and F(t+1), as a temporal interlaced sequence of three consecutive fields of the digital video input image signal, where F(t−1) represents a previous field, F(t) represents a current field, and F(t+1) represents a next field, in the temporal interlaced sequence of fields.

In sub-step (i) of Step (b), there is assigning a first local neighborhood of neighboring pixels to each missing or 'virtual' pixel, V(i,j), hereinafter, referred to as virtual pixel, V(i,j), within a missing horizontal line of the current field, F(t), in the global input grid of pixels featured in the streaming digital video input image signal, I.

V(i,j) represents the value of a virtual pixel at time (t) having position coordinates of horizontal line i and vertical column j in the current field, F(t). The first local neighborhood assigned to each virtual pixel, V(i,j), consists of (2L)(2M+1) neighboring pixels, where L>0 and M≧0 are positive integers. (L)(2M+1) neighboring pixels are located in horizontal lines i−1, i−2, . . . , i−L, and (L)(2M+1) neighboring pixels are located in horizontal lines i+1, i+2, . . . , i+L, in the current field F(t), where horizontal line i of the current field, F(t), is missing due to the interlace format.

In sub-step (ii) of Step (b), there is assigning a second local neighborhood of neighboring pixels to each pixel located in the previous field, F(t−1), and to each pixel located in the next field, F(t+1), in the global input grid of pixels featured in the streaming digital video input image signal, I. The second local neighborhood assigned to each pixel located in horizontal lines i−K, . . . , i, . . . , i+K, in the previous field, F(t−1), and to each pixel located in the next field, F(t+1), consists of (2K+1)(2M+1) neighboring pixels, where K is a positive integer greater than zero, that is, 1, 2, 3, ...

Additionally, or alternatively, pixels located in previous horizontal lines and/or next horizontal lines relative to pixel P(i,j) and/or relative to pixel N(i,j) may be selected for assigning the second local neighborhood of pixels to each pixel, P(i,j) and/or to each pixel N(i,j), located in the temporal interlaced sequence of the three consecutive fields, F(t−1), F(t), and F(t+1), in the global input grid of pixels featured in the streaming digital video input image signal, I.

In sub-step (iii) of Step (b), there is selecting a previous pixel, P(i,j), and a next pixel, N(i,j), as two sequential pixels in the previous field, F(t−1), and in the next field, F(t+1), respectively. P(i,j) represents the value of the previous pixel at time (t−1) having position coordinates of horizontal line i and vertical column j in the previous field, F(t−1), and N(i,j) represents the value of the next pixel at time (t+1) having position coordinates of horizontal line i and vertical column j, located at the same position coordinates (i,j) as the previous pixel, P(i,j), in the next field, F(t+1).

In Step (c) (act **130**) there is determining the entropy of each virtual pixel, V(i,j), each previous pixel, P(ij), and each next pixel, N(ij), in the temporal interlaced sequence of the three consecutive fields, F(t−1), F(t), and F(t+1), relative to the assigned and characterized first and second local neighborhoods of neighboring pixels located in the temporal interlaced sequence of the three consecutive fields, F(t−1), F(t), and F(t+1), in the global input grid, as defined in preceding Step (b), of pixels featured in the streaming digital video input image signal, I.

As previously stated above, the main aspect of novelty and inventiveness of the present invention is based upon determining the degree of randomness or disorder, or entropy, and determining the entropy fluctuation, of each pixel relative to inter-local neighborhoods and intra-local neighborhoods of pluralities of selected pixels originating from the streaming digital video image signal. This fundamental aspect of 'pixel entropy', for characterizing the degree or extent of randomness or disorder, and fluctuation thereof, of a single pixel based on its surrounding local neighborhood, of a streaming digital video image signal, enables one to efficiently determine appropriate further processing of the pixels of the streaming digital video image signal.

Accordingly, in the present invention, there is determining the degree of randomness or disorder, or the entropy, and determining the entropy fluctuation, of each pixel, that is, each virtual pixel, V(i,j), each previous pixel, P(i,j), and each next pixel, N(i,j), relative to the above assigned and characterized first and second local neighborhoods of pixels located in the temporal interlaced sequence of the three consecutive fields, F(t−1), F(t), and F(t+1), of the global input grid of pixels featured in the streaming digital video input image signal, I.

In sub-step (i) of Step (c), there is calculating values of pixel inter-local neighborhood parameters for each previous pixel, P(i,j), in the previous field, F(t−1), and for each next pixel, N(i,j), in the next field, F(t+1). The value of each pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between neighboring pixels located in subsets of the assigned and characterized first local neighborhood of each virtual pixel, V(i,j), in the current field, F(t), and the assigned and characterized second local neighborhood, of each previous pixel, P(i,j), in the previous field, F(t−1), and of each next pixel, N(i,j), in the next field, F(t+1), of Step (b), respectively.

In sub-step (1) of sub-step (i), there is calculating values of two previous-pixel inter-local neighborhood parameters, herein, referred to as first previous-pixel inter-local neighborhood parameter, P**1**, and second previous-pixel inter-local neighborhood parameter, P**2**, for each previous pixel, P(i,j), in the previous field, F(t−1). The value of each previous-pixel inter-local neighborhood parameter, P**1** and P**2**, represents a regional sum of inter-local neighborhood weighted distances measured between pixels located in subsets of the first local neighborhood of each virtual pixel, V(i,j), consisting of (2L)(2M+1) neighboring pixels, and the second local neighborhood of each previous pixel, P(i,j), consisting of (2K+1)(2M+1) neighboring pixels.

First previous-pixel inter-local neighborhood parameter, P**1**, represents a regional sum of inter-local neighborhood weighted distances measured between subsets of the first local neighborhood of each virtual pixel, V(i,j), having (2L)(2M+1) neighboring pixels located in horizontal lines i−L, . . . , i−1, i+1, . . . , i+L, in the current field, F(t), and of the second local neighborhood of each previous pixel, P(i,j), having (2K+1)(2M+1) neighboring pixels located in horizontal lines i−K, . . . , i−2, i−1, i, i+1, i+2, . . . , i+K, in the previous field, F(t−1).

A particular case is where K=L−1 and L=1. Thus, the second local neighborhood of previous pixel, P(i,j), contains only horizontal line i and 2M+1 neighboring pixels located in the horizontal line i. Accordingly, in this case, the regional sum of inter-local neighborhood weighted distances, P**1**, is calculated between subsets of the first local neighborhood of each virtual pixel, V(i,j), having (2)(2M+1) neighboring pixels located in horizontal line i−1 in the current field, F(t), and of the second local neighborhood of each previous pixel, P(i,j), having (2M+1) neighboring pixels located in horizontal line i in the previous field, F(t−1). Thus, the regional sum of inter-local neighborhood weighted distances, P**1**, is determined from the sum of the weighted distances measured

between each virtual pixel, V(i,j), located in the horizontal line i−1 in the current field, F(t), and each corresponding previous pixel, P(i,j), located in the horizontal line i in the previous field, F(t−1).

Second previous-pixel inter-local neighborhood parameter, P**2**, represents a regional sum of inter-local neighborhood weighted distances measured between additional subsets of the first local neighborhood of each virtual pixel, V(i,j), having the (2L)(2M+1) neighboring pixels located in horizontal lines i−L, . . . , i−1, i+1, . . . , i+L, in the current field, F(t), and of the second local neighborhood of each previous pixel, P(i,j), having the (2K+1)(2M+1) neighboring pixels located in horizontal lines i−K, . . . , i−2, i−1, i, i+1, i+2, . . . , i+K, in the previous field, F(t−1).

In sub-step (2) of sub-step (i), there is calculating values of two next-pixel inter-local neighborhood parameters, herein, referred to as first next-pixel inter-local neighborhood parameter, N**1**, and second next-pixel inter-local neighborhood parameter, N**2**, for each next pixel, N(i,j), in the next field, F(t+1). The value of each next-pixel inter-local neighborhood parameter, N**1** and N**2**, represents a regional sum of inter-local neighborhood weighted distances measured between pixels located in subsets of the first local neighborhood of each virtual pixel, V(i,j), consisting of (2L)(2M+1) neighboring pixels, and the second local neighborhood of each next pixel, N(i,j), consisting of (2K+1)(2M+1) neighboring pixels.

First next-pixel inter-local neighborhood parameter, N**1**, represents a regional sum of inter-local neighborhood weighted distances measured between subsets of the first local neighborhood of each virtual pixel, V(i,j), having the (2L)(2M+1) neighboring pixels located in horizontal lines i−L, . . . , i−1, i+1, . . . , i+L, in the current field, F(t), and of the second local neighborhood of each next pixel, N(i,j), having the (2K+1)(2M+1) neighboring pixels located in horizontal lines i−K, . . . , i−2, i−1, i, i+1, i+2, . . . , i+K, in the next field, F(t−1).

A particular case is where K=L−1 and L=1. Thus, the second local neighborhood of next pixel, N(i,j), contains only horizontal line i and 2M+1 neighboring pixels located in the horizontal line i. Accordingly, in this case, the regional sum of inter-local neighborhood weighted distances, N**1**, is calculated between subsets of the first local neighborhood of each virtual pixel, V(i,j), having (2)(2M+1) neighboring pixels located in horizontal line i−1 in the current field, F(t), and of the second local neighborhood of each next pixel, N(i,j), having (2M+1) neighboring pixels located in horizontal line i in the next field, F(t+1). Thus, the regional sum of inter-local neighborhood weighted distances, N**1**, is determined from the sum of the weighted distances measured between each virtual pixel, V(i,j), located in the horizontal line i−1 in the current field, F(t), and each corresponding next pixel, N(i,j), located in the horizontal line i in the next field, F(t+1).

Second next-pixel inter-local neighborhood parameter, N**2**, represents a regional sum of inter-local neighborhood weighted distances measured between additional subsets of the first local neighborhood of each virtual pixel, V(i,j), having (2L)(2M+1) neighboring pixels located in horizontal lines i−L, . . . , i−1, i+1, . . . , i+L, in the current field, F(t), and of the second local neighborhood of each next pixel, N(i,j), having (2K+1)(2M+1) neighboring pixels located in horizontal lines i−K, . . . , i−2, i−1, i, i+1, i+2, . . . , i+K, in the next field, F(t+1).

In sub-step (ii) of Step (c), there is calculating a value of a virtual-pixel intra-local neighborhood parameter, herein, referred to as virtual-pixel intra-local neighborhood parameter, VIRT, for each virtual pixel, V(i,j), in the current field, F(t). The value of the virtual-pixel intra-local neighborhood parameter, VIRT, represents a regional sum of the intra-local neighborhood weighted distances measured between pixels located in horizontal lines i−1, i−2, . . . , i−L, of the first local neighborhood of each virtual pixel, V(i,j), consisting of (L)(2M+1) neighboring pixels, and pixels located in horizontal lines i+1, i+1, i+2, . . . , i+L, within the same first local neighborhood of the same virtual pixel, V(i,j), consisting of (L)(2M+1) neighboring pixels, where L is a positive integer greater than zero, that is, 1,2,3, ...

In sub-step (iii) of Step (c), there is adjusting a value of a pixel entropy counter for each of the previous pixel, P(i,j), in the previous field, F(t−1), the next pixel, N(i,j), in the next field, F(t+1), and the virtual pixel, V(i,j), in the current field, F(t).

The value of each entropy counter is adjusted according to the results obtained by performing the following mathematical logical operations on values of the pixel local neighborhood parameters, that is, first and second previous-pixel inter-local neighborhood parameters, P**1** and P**2**, respectively, first and second next-pixel inter-local neighborhood parameters, N**1** and N**2**, respectively, and virtual-pixel inter-local neighborhood parameter, VIRT, previously defined and calculated according to preceding sub-steps (i) and (ii) of Step (c).

(1) If the maximum value, Pmax, between P**1** and P**2**, is greater than the maximum value, Nmax, between N**1** and N**2**, and is greater than the value of VIRT, then the value of the first previous-pixel entropy counter, P**1**-entropy counter, is increased by 1.

(2) If the minimum value, Pmin, between P**1** and P**2**, is lower than the minimum value, Nmin, between N**1** and N**2**, and is lower than the value of VIRT, then the value of the second previous-pixel entropy counter, P**2**-entropy counter, is increased by 1.

(3) If the maximum value, Nmax, between N**1** and N**2**, is greater than the maximum value, Pmax, between P**1** and P**2**, and is greater than the value of VIRT, then the value of the first next-pixel entropy counter, N**1**-entropy counter, is increased by 1.

(4) If the minimum value, Nmin, between N**1** and N**2**, is lower than the minimum value, Pmin, between P**1** and P**2**, and is lower than the value of VIRT, then the value of the second next-pixel entropy counter, N**2**-entropy counter, is increased by 1.

(5) If the value of VIRT is greater than the maximum value, Nmax, and greater than the maximum value, Pmax, then the value of the first virtual-pixel entropy counter, VIRT**1**-entropy counter, is increased by 1.

(6) If the value of VIRT is lower than the minimum value, Nmin, and lower than the minimum value, Pmin, then the value of the second virtual-pixel entropy counter, VIRT**2**-entropy counter, is increased by 1.

In sub-step (iv) of Step (c), there is calculating a value of the entropy of each previous pixel, P(i,j), in the previous field, F(t−1), of each next pixel, N(i,j), in the next field, F(t+1), and of each virtual pixel, V(i,j), in the current field, F(t), and determining relative relationships among the entropy values, by using the values of the pixel entropy counters of preceding sub-step (iii) of Step (c).

This sub-step is performed according to the following sequence of mathematical logical operations performed on values of the pixel entropy counters, that is, first and second previous-pixel entropy counters, P**1**-entropy counter and P**2**-entropy counter, respectively, first and second next-pixel entropy counters, N**1**-entropy counter and N**2**-entropy

counter, respectively, and virtual-pixel entropy counter, VIRT-entropy counter, previously defined and calculated according to preceding sub-step (iii) of Step (c).

(1) Initialization: set P-entropy counter=0, N-entropy counter=0, and VIRT-entropy counter=0, according to external set, that is, initialization is for every single pixel, or up to semi field, or entire field, or up to several sequential fields.

(2) Set:

$$P12=p1*(P1\text{-entropy counter})+p2*(P2\text{-entropy counter}),$$

$$N12=n1*(N1\text{-entropy counter})+n2*(N2\text{-entropy counter}), \text{ and}$$

$$VIRT12=v1*(VIRT1\text{-entropy counter})+v2*(VIRT2\text{-entropy counter}),$$

where p1, p2, n1, n2, v1, v2, are all real positive constants, and the asterisk, *, represents the multiplication operation.

(3) Then:

(I) if P12 is greater than N12 and greater than VIRT12, or if the two variable entropy function, E(x, y), of the two positive variables x and y, where x and y correspond to functions, and are expressed in terms, of the pixel entropy counters, which has an exemplary form as E(x, y)=(1+x)*log[1/(1+y)], or has an exemplary form as E(x, y)=(1+x)/(1+y), such that the value of the entropy function, E(P12, N12)=(1+P12)/(1+N12) is greater than the value of the entropy function E(VIRT12, P12)=(1+VIRT12)/(1+P12), then the value of the entropy of the previous pixel, P(i,j), is less than the value of the entropy of the next pixel, N(i,j), and less than the value of the entropy of the virtual pixel, V(i,j).

(II) if N12 is greater than P12 and greater than VIRT12, or if the two variable entropy function, E(x, y), of the two positive variables x and y, which has an exemplary form as E(x, y)=(1+x)*log[1/(1+y)], or has an exemplary form as E(x, y)=(1+x)/(1+y), such that the value of the entropy function E(N12, P12)=(1+N12)/(1+P12) is greater than the value of the entropy function E(VIRT12, N12)=(1+VIRT12)/(1+N12), then the value of the entropy of the next pixel, N(i,j), is less than the value of the entropy of the previous pixel, P(i,j), and less than the value of the entropy of the virtual pixel, V(i,j).

(III) if VIRT12 is greater than P12 and greater than N12, then the value of the entropy of the virtual pixel, V(i,j), is less than the value of the entropy of the previous pixel, P(i,j), and less than the value of the entropy of the next pixel, N(i,j).

(IV) if none of the above can be determined, then the value of the entropy of the virtual pixel, V(i,j), the value of the previous pixel, P(i,j), and the value of the next pixel, N(i,j), are all equal.

Completion of Step (c) results in obtaining values of the entropy and determining relative relationships among the values of the entropy of each previous pixel, P(i,j), in the previous field, F(t−1), each next pixel, N(i,j), in the next field, F(t+1), and each virtual pixel, V(i,j), in the current field, F(t), in the global input grid, as defined in preceding Step (b), of pixels featured in the streaming digital video input image signal, I.

A main application of the method of the present invention is for automatically detecting the nature of a video source, that is, by identifying the original mode of the real time streaming digital video image input signal (film movie, video camera, graphics, and a combination thereof). Implementation of the present invention (1) is independent of the type of the mode conversion used for generating the original streaming digital video image input signal, for example, a 3:2 or 2:2 pull down mode conversion method for converting film movies appropriate for a DVD disk player operating with a video NTSC or PAL format, and (2) is not based upon known methods or techniques involving 'a priori' pattern recognition based upon known methods or techniques involving evaluation of sets of 'accumulated' or 'summed' differences, instead of 'individual' differences, of pixel values located in successive fields of the streaming digital video image signal.

Another very useful application of the method of the present invention is for correcting errors produced during real time editing of the streaming digital video image input signal. In particular, if the video source is of film mode and contains various sections of bad edit, that is, bad editing occurs whenever two non-continuous or partially continuous film scenes are attached or glued together for forming a glued video sequence, whereby at a certain point in time the glued video sequence does not match the original sequence. Such an artifact is called bad edit which generates fractions in lines and pixels in the glued video sequence of the streaming digital video images signal.

For correcting errors produced during editing of the streaming digital video image input signal, the method of the present invention is implemented for automatically deciding, by performing sequences of mathematical logical operations, not to use values of the previous pixel, P(i,j), in the previous field, F(t−1), or of the next pixel, N(i,j), in the next field, F(t+1), for assigning a real value to the virtual pixel, V(i,j), in the current field, F(t), in the global input grid of pixels featured in the streaming digital video input image signal, I.

The method of the present invention additionally includes the following steps, Steps (d)-(e), specifically directed toward the just described image processing applications of mode detection and correcting editing errors.

In order to further characterize the value of the entropy of the virtual pixel, V(i,j), in the current field, F(t), for determining different ways of performing local interpolation on the pixels, the method of the present invention additionally includes the following step, Step (d), for adjusting a value of the fluctuation of the entropy of the virtual pixel, V(i,j), herein, referred to as virtual-pixel entropy fluctuation, VIRT-entropy fluctuation.

In Step (d) (act **140**), there is defining and adjusting a value of fluctuation of the value of the entropy of each virtual pixel, V(ij), in the current field, F(t), in the global input grid of pixels featured in the streaming digital video input image signal, I. The following two sub-steps are performed for adjusting the fluctuation of the value of the entropy of the virtual pixel, V(i,j), herein, defined and referred to as virtual-pixel entropy fluctuation, VIRT-entropy fluctuation.

In sub-step (i) of Step (d), there is initializing and setting the value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, equal to zero, for each virtual pixel, V(i,j), in the current field, F(t).

In sub-step (ii) of Step (d), there is increasing the value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, by 1 if there is a change in slope between sequential pairs of neighboring pixels in the virtual pixel local neighborhood, that is, in the first local neighborhood of neighboring pixels to each virtual pixel, V(i,j), as previously defined and characterized in sub-step (i) of Step (b), above. For example, the value of the virtual-pixel entropy fluctua-

tion, VIRT-entropy fluctuation, of a virtual pixel, V(i,j), located in the first local neighborhood of V(i,j), in the horizontal line i−1 containing 5 pixels, whereby L=0, M=4, and (2M+1)=5, with pixel values of (120 50 200 30 20), is equal to 2, since the slope changes twice.

In Step (e) (act **150**), there is assigning a real value to the virtual pixel, V(i,j), in the current field, F(t), in the global input grid of pixels featured in the streaming digital video input image signal, I.

The real value of the virtual pixel, V(i,j), is assigned according to the following mathematical logical operations performed on values of the entropy of each of the previous pixel, P(i,j), in the previous field, F(t−1); the next pixel, N(i,j), in the next field, F(t+1); and the virtual pixel, V(i,j), in the current field, F(t), which were calculated according to preceding sub-step (iv) of Step (c).

(i) If the previous pixel, P(i,j), has the lowest or minimal value of the entropy, as defined and calculated in (I) of sub-step (iv) of Step (c), then the virtual pixel, V(i,j), in the current field, F(t), is assigned the real value of the previous pixel, P(i,j).

(ii) If the next pixel, N(i,j) has the lowest or minimal value of the entropy, as defined and calculated in (II) of sub-step (iv) of Step (c), then the virtual pixel, V(i,j), in the current field, F(t), is assigned the real value of the next pixel, N(i,j).

(iii) If the virtual pixel, V(i,j), has the lowest or minimal value of the entropy, as defined and calculated in (III) of sub-step (iv) of Step (c), then the virtual pixel, V(i,j), is assigned the real value according to the value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, as follows:

(1) If the value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, is greater or equal to a positive threshold value, herein referred to as Q, then the real value of the virtual pixel, V(i,j), is determined by using a procedure of spline interpolation, such as a bilinear spline (B-spline) interpolation procedure, or a cubic spline (C-spline) interpolation procedure. Spline interpolation procedures are readily known in the art of numerical methods and analysis, in general, and in the art of numerical interpolation, in particular, for example, as described in "Theory and Applications of Numerical Analysis", G. M. Philips and P. J. Taylor, Academic Press, 1973.

(2) If the value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, is between two arbitrary positive integers, herein, referred to as Ua and Ub, where Ua<Ub<Q, then the real value of the virtual pixel, V(i,j), is determined by using a local directional interpolation technique, such as that disclosed in U.S. Pat. No. 6,239,842, entitled "Method Of De-interlacing Interlaced Video Formats Using A Mixed Mode Spatial And Temporal Approximation Technique", by the same inventor as the present invention, for generating an adaptive approximation.

Directional interpolation refers to interpolation performed along vertical, horizontal, or diagonal, edges or singular lines, where, with respect to implementing the method of the present invention, edge is defined as a continuous collection of singular points characterizing and distinguishing the nature or mode of a streaming digital video image. For example, caricature lines define continuous singular points, and as consequence, characterize and distinguish the nature of the streaming digital video image. Edge or singular line is a well known concept in the field of image processing, for example, as described in the textbook "Fundamental of Digital Image Processing", Anil K. Jain, Prentice Hall, 1989.

Regarding this step in the method of the present invention, the value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, determines the type, that is, directional or non-directional, of the interpolation used for assigning a real value to the virtual pixel, V(i,j), from the surrounding local neighborhood of the virtual pixel, V(i,j).

(iv) In the case where value of the virtual-pixel entropy fluctuation, VIRT-entropy fluctuation, pixel entropy cannot be determined by any of (I), (II), or (III), of sub-step (iv) of Step (c), then the real value of the virtual pixel, V(i,j), the value of the previous pixel, P(i,j), and the value of the next pixel, N(i,j), are all equal.

In Step (f) (act **160**), there is repeating Steps (b) through (e) (acts **120**-**150**, for a pre-determined plurality of additional temporal interlaced sequences of three consecutive fields, in the global input grid of frames featured in the streaming digital video input image signal, I, for generating a streaming digital video output image signal, O, featuring complete frames of fields of a plurality of output image signal pixels, O(k,l), which can be plotted in a global output grid of a digital video image signal processing device, whose position coordinates in the global output grid are indicated by horizontal line (row) k, and vertical column l.

In Step (g) (act **170**), there is displaying the streaming digital video output image signal, O, of Step (f), on a display of a digital video image display device.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable subcombination.

All publications, patents and patent applications mentioned in this specification are herein incorporated in their entirety by reference into the specification, to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated herein by reference. In addition, citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the present invention.

While the invention has been described in conjunction with specific embodiments and examples thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

What is claimed is:

1. A method for determining entropy of a pixel of a real time streaming digital video image signal to identify the origin of, and process, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, comprising the steps of:

(a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;

(b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and

(c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels, said determining comprising the steps of:

(i) calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;

(ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field;

(iii) adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and

(iv) calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, from said values of said pixel entropy counters of said pixels.

2. The method of claim **1**, whereby in step (a) the streaming digital video image input signal is received following subjecting the streaming digital video image input signal to a pull down mode conversion method selected from the group consisting of a 3:2 pull down mode conversion method, a 2:2 pull down mode conversion method, and a scan rate conversion, other than the 3:2 pull down mode conversion and the 2:2 pull down conversion, from a non-interlaced film format or a progressive video format to an interlaced video format.

3. The method of claim **1**, whereby step (b) further comprises:

(i) assigning a first local neighborhood of said neighboring pixels to each said virtual pixel within a missing horizontal line of said current field.

4. The method of claim **3**, whereby step (b) further comprises:

(ii) assigning a second local neighborhood of said neighboring pixels to each said pixel located in said previous field, and to each said pixel located in said next field.

5. The method of claim **4**, whereby pixels located in horizontal lines of a field previous to said previous field are selected for said assigning said second local neighborhood to each said previous pixel located in said temporal interlaced sequence of said three consecutive fields.

6. The method of claim **4**, whereby pixels located in horizontal lines of a field next to said next field are selected for said assigning said second local neighborhood to each said next pixel located in said temporal interlaced sequence of said three consecutive fields.

7. The method of claim **4**, whereby step (b) further comprises:

(iii) selecting said previous pixel and said next pixel as two sequential pixels in said previous field and in said next field, respectively.

8. The method of claim **1**, whereby step (i) of step (c) further comprises:

(1) calculating values of two previous-pixel inter-local neighborhood parameters for each said previous pixel in said previous field, said value of each said previous-pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said pixels located in subsets of a first local neighborhood of each said virtual pixel, and a second local neighborhood of each said previous pixel.

9. The method of claim **1**, whereby step (i) of step (c) further comprises:

(2) calculating values of two next-pixel inter-local neighborhood parameters for each said next pixel in said next field, said value of each said next-pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said pixels located in subsets of a first local neighborhood of each said virtual pixel, and a second local neighborhood of each said next pixel.

10. The method of claim **1**, whereby in step (ii) of step (c), said value of said virtual-pixel intra-local neighborhood parameter represents a regional sum of intra-local neighborhood weighted distances measured between said pixels located in horizontal lines of a first local neighborhood of each said virtual pixel, and said pixels located in different horizontal lines within same said first local neighborhood of same said virtual pixel.

11. The method of claim **1**, whereby in step (iii) of step (c) said value of each said entropy counter is adjusted according to results obtained by performing mathematical logical operations on said values of said pixel local neighborhood parameters and on said values of said virtual-pixel inter-local neighborhood parameter.

12. The method of claim **1**, whereby step (iv) of step (c) is performed according to a sequence of mathematical logical operations performed on said values of said pixel entropy counters of said previous pixel in said previous field, said next pixel in said next field, and of said virtual pixel in said current field.

13. The method of claim **1**, whereby step (iv) of step (c) includes use of evaluating an entropy function expressed in terms of said pixel entropy counters of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field.

14. The method of claim **1**, whereby step (iv) of step (c) further includes determining relative relationships among said entropy values of said pixels, by using said values of said pixel entropy counters of said pixels.

15. The method of claim **1**, further comprising the additional step of: (d) defining and adjusting a value of fluctuation of said value of the entropy of each said virtual pixel in said current field in said global input grid of said pixels included in the streaming digital video input image signal, thereby further characterizing said value of the entropy of each said virtual pixel in said current field.

16. The method of claim **15**, further comprising the steps of: (i) initializing and setting said value of said fluctuation of said value of the entropy equal to zero, for each said virtual pixel in said current field; and (ii) increasing said value of said fluctuation of said value of the entropy if there is a change in slope between sequential pairs of said neighboring pixels in said local neighborhood of said virtual pixel.

17. The method of claim **15**, further comprising the additional step of: (e) assigning a real value to each said

virtual pixel in said current field in said global input grid of said pixels in the streaming digital video input image signal.

18. The method of claim **17**, whereby said assigning is performed according to mathematical logical operations performed on said values of the entropy of said previous pixel in said previous field, said next pixel in said next field, and said virtual pixel in said current field.

19. The method of claim **17**, whereby said real value assigned to a said virtual pixel in said current field is selected from the group consisting of real value of said previous pixel, and real value of said next pixel.

20. The method of claim **17**, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel.

21. The method of claim **17**, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel, by using a procedure of spline interpolation.

22. The method of claim **17**, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel, by using a procedure of directional interpolation.

23. The method of claim **17**, whereby said real value assigned to a said virtual pixel in said current field is equal to real value of said previous pixel and to real value of said next pixel.

24. The method of claim **17**, further comprising the step of: (f) repeating steps (b) through (e) for a pre-determined plurality of additional said temporal interlaced sequences of three consecutive fields in said global input grid of frames featured in the streaming digital video input image signal, for generating a streaming digital video output image signal.

25. The method of claim **24**, further comprising the step of: (g) displaying said streaming digital video output image signal on a display of a digital video image display device.

26. The method of claim **1**, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically detecting nature of a video source by identifying original mode of the real time streaming digital video image input signal.

27. The method of claim **26**, whereby said original mode of the real time streaming digital video image input signal is selected from the group consisting of a film movie mode, a video camera mode, a graphics mode, and a combination of said film movie mode, said video camera mode, and said graphics mode.

28. The method of claim **1**, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for correcting an error produced during real time editing of the streaming digital video image input signal.

29. The method of claim **1**, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.

30. A method determining entropy of a pixel of a real time streaming digital video image signal, for automatically detecting the nature of a video source, by identifying original mode of the real time streaming digital video image input signal, comprising the steps of:

(a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;

(b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and

(c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels, said determining comprising the steps of:

(i) calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;

(ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field;

(iii) adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field;

(iv) calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, from said values of said pixel entropy counters of said pixels;

(d) defining and adjusting a value of fluctuation of said value of the entropy of each said virtual pixel in said current field in said global input grid of said pixels included in the streaming digital video input image signal, thereby further characterizing said value of the entropy of each said virtual pixel in said current field; and

(e) assigning a real value to each said virtual pixel in said current field in said global input grid of said pixels in the streaming digital video input image signal, whereby said real values of said virtual pixels in the streaming digital video input image signal correspond to identification of the original mode of the real time streaming digital video image input signal.

31. The method of claim 30, whereby in step (a) the streaming digital video image input signal is received following subjecting the streaming digital video image input signal to a pull down mode conversion method selected from the group consisting of a 3:2 pull down mode conversion method, a 2:2 pull down mode conversion method, and a scan rate conversion, other than the 3:2 pull down mode conversion and the 2:2 pull down mode conversion, from a non-interlaced film format or a progressive video format to an interlaced video format.

32. The method of claim 30, whereby step (b) further comprises:

(i) assigning a first local neighborhood of said neighboring pixels to each said virtual pixel within a missing horizontal line of said current field.

33. The method of claim 32, whereby step (b) further comprises:

(ii) assigning a second local neighborhood of said neighboring pixels to each said pixel located in said previous field, and to each said pixel located in said next field.

34. The method of claim 33, whereby pixels located in horizontal lines of a field previous to said previous field are selected for said assigning said second local neighborhood to each said previous pixel located in said temporal interlaced sequence of said three consecutive fields.

35. The method of claim 33, whereby pixels located in horizontal lines of a field next to said next field are selected for said assigning said second local neighborhood to each said next pixel located in said temporal interlaced sequence of said three consecutive fields.

36. The method of claim 33, whereby step (b) further comprises:

(iii) selecting a said previous pixel and a said next pixel as two sequential pixels in said previous field and in said next field, respectively.

37. The method of claim 30, whereby step (i) of step (c) further comprises:

(1) calculating values of two previous-pixel inter-local neighborhood parameters for each said previous pixel in said previous field, said value of each said previous-pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said pixels located in subsets of a first local neighborhood of each said virtual pixel, and a second local neighborhood of each said previous pixel.

38. The method of claim 30, whereby step (i) of step (c) further comprises;

(2) calculating values of two next-pixel inter-local neighborhood parameters for each said next pixel in said next field, said value of each said next-pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said pixels located in subsets of a first local neighborhood of each said virtual pixel, and a second local neighborhood of each said next pixel.

39. The method of claim 30, whereby in step (ii) of step (c), said value of said virtual-pixel intra-local neighborhood parameter represents a regional sum of intra-local neighborhood weighted distances measured between said pixels located in horizontal lines of a first local neighborhood of each said virtual pixel, and said pixels located in different horizontal lines within same said first local neighborhood of same said virtual pixel.

40. The method of claim 30, whereby in step (iii) of step (c) said value of each said entropy counter is adjusted according to results obtained by performing mathematical

logical operations on said values of said pixel local neighborhood parameters and on said values of said virtual-pixel inter-local neighborhood parameter.

41. The method of claim 30, whereby step (iv) of step (c) is performed according to a sequence of mathematical logical operations performed on said values of said pixel entropy counters of said previous pixel in said previous field, said next pixel in said next field, and of said virtual pixel in said current field.

42. The method of claim 30, whereby step (iv) of step (c) includes use of evaluating an entropy function expressed in terms of said pixel entropy counters of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field.

43. The method of claim 30, whereby step (iv) of step (c) further includes determining relative relationships among said entropy values of said pixels, by using said values of said pixel entropy counters of said pixels.

44. The method of claim 30, further comprising the steps of: (i) initializing and setting said value of said fluctuation of said value of the entropy equal to zero, for each said virtual pixel in said current field; and (ii) increasing said value of said fluctuation of said value of the entropy if there is a change in slope between sequential pairs of said neighboring pixels in said local neighborhood of said virtual pixel.

45. The method of claim 30, whereby said assigning is performed according to mathematical logical operations performed on said values of the entropy of said previous pixel in said previous field, said next pixel in said next field, and said virtual pixel in said current field.

46. The method of claim 30, whereby said real value assigned to a said virtual pixel in said current field is selected from the group consisting of real value of said previous pixel, and real value of said next pixel.

47. The method of claim 30, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel.

48. The method of claim 30, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel, by using a procedure of spline interpolation.

49. The method of claim 30, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel, by using a procedure of directional interpolation.

50. The method of claim 30, whereby said real value assigned to a said virtual pixel in said current field is equal to real value of said previous pixel and to real value of said next pixel.

51. The method of claim 30, further comprising the step of: (f) repeating steps (b) through (e) for a pre-determined plurality of additional said temporal interlaced sequences of three consecutive fields in said global input grid of frames featured in the streaming digital video input image signal, for generating a streaming digital video output image signal.

52. The method of claim 51, further comprising the step of: (g) displaying said streaming digital video output image signal on a display of a digital video image display device.

53. The method of claim 30, whereby the original mode of the real time streaming digital video image input signal is selected from the group consisting of a film movie mode, a video camera mode, a graphics mode, and a combination of said film movie mode, said video camera mode, and said graphics mode.

54. The method of claim **30**, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for correcting an error produced during real time editing of the streaming digital video image input signal.

55. The method of claim **30**, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.

56. A method determining entropy of a pixel of a real time streaming digital video image signal, for automatically correcting an error produced during real time editing of the real time streaming digital video image input signal, comprising the steps of:

(a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;

(b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and

(c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels, said determining comprising the steps of:

(i) calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;

(ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field;

(iii) adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and

(iv) calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said

pixel entropy counters of said pixels, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.

57. The method of claim **56**, whereby in step (a) the streaming digital video image input signal is received following subjecting the streaming digital video image input signal to a pull down mode conversion method selected from the group consisting of a 3:2 pull down mode conversion method, a 2:2 pull down mode conversion method, and a scan rate conversion, other than the 3:2 pull down mode conversion and the 2:2 pull down mode conversion, from a non-interlaced film format or a progressive video format to an interlaced video format.

58. The method of claim **56**, whereby step (b) further comprises: (i) assigning a first local neighborhood of said neighboring pixels to each said virtual pixel within a missing horizontal line of said current field.

59. The method of claim **58**, whereby step (b) further comprises: (ii) assigning a second local neighborhood of said neighboring pixels to each said pixel located in said previous field, and to each said pixel located in said next field.

60. The method of claim **59**, whereby pixels located in horizontal lines of a field previous to said previous field are selected for said assigning said second local neighborhood to each said previous pixel located in said temporal interlaced sequence of said three consecutive fields.

61. The method of claim **59**, whereby pixels located in horizontal lines of a field next to said next field are selected for said assigning said second local neighborhood to each said next pixel located in said temporal interlaced sequence of said three consecutive fields.

62. The method of claim **59**, whereby step (b) further comprises: (iii) selecting a said previous pixel and a said next pixel as two sequential pixels in said previous field and in said next field, respectively.

63. The method of claim **56**, whereby step (i) of step (c) further comprises:

(1) calculating values of two previous-pixel inter-local neighborhood parameters for each said previous pixel in said previous field, said value of each said previous-pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said pixels located in subsets of a first local neighborhood of each said virtual pixel, and a second local neighborhood of each said previous pixel.

64. The method of claim **56**, whereby step (i) of step (c) further comprises:

(2) calculating values of two next-pixel inter-local neighborhood parameters for each said next pixel in said next field, said value of each said next-pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured

between said pixels located in subsets of a first local neighborhood of each said virtual pixel, and a second local neighborhood of each said next pixel.

65. The method of claim **56**, whereby in step (ii) of step (c), said value of said virtual-pixel intra-local neighborhood parameter represents a regional sum of intra-local neighborhood weighted distances measured between said pixels located in horizontal lines of a first local neighborhood of each said virtual pixel, and said pixels located in different horizontal lines within same said first local neighborhood of same said virtual pixel.

66. The method of claim **56**, whereby in step (iii) of step (c) said value of each said entropy counter is adjusted according to results obtained by performing mathematical logical operations on said values of said pixel local neighborhood parameters and on said values of said virtual-pixel inter-local neighborhood parameter.

67. The method of claim **56**, whereby step (iv) of step (c) is performed according to a sequence of mathematical logical operations performed on said values of said pixel entropy counters of said previous pixel in said previous field, said next pixel in said next field, and of said virtual pixel in said current field.

68. The method of claim **56**, whereby step (iv) of step (c) includes use of evaluating an entropy function expressed in terms of said pixel entropy counters of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field.

69. The method of claim **56**, whereby step (iv) of step (c) further includes determining relative relationships among said entropy values of said pixels, by using said values of said pixel entropy counters of said pixels.

70. The method of claim **56**, further comprising the additional step of:

(d) defining and adjusting a value of fluctuation of said value of the entropy of each said virtual pixel in said current field in said global input grid of said pixels included in the streaming digital video input image signal, thereby further characterizing said value of the entropy of each said virtual pixel in said current field.

71. The method of claim **70**, further comprising the steps of:

(i) initializing and setting said value of said fluctuation of said value of the entropy equal to zero, for each said virtual pixel in said current field; and

(ii) increasing said value of said fluctuation of said value of the entropy if there is a change in slope between sequential pairs of said neighboring pixels in said local neighborhood of said virtual pixel.

72. The method of claim **70**, further comprising the additional step of:

(e) assigning a real value to each said virtual pixel in said current field in said global input grid of said pixels in the streaming digital video input image signal.

73. The method of claim **72**, whereby said assigning is performed according to mathematical logical operations performed on said values of the entropy of said previous pixel in said previous field, said next pixel in said next field, and said virtual pixel in said current field.

74. The method of claim **72**, whereby said real value assigned to a said virtual pixel in said current field is selected from the group consisting of real value of said previous pixel, and real value of said next pixel.

75. The method of claim **72**, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel.

76. The method of claim **72**, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel, by using a procedure of spline interpolation.

77. The method of claim **72**, whereby said real value is assigned to a said virtual pixel in said current field according to a said value of fluctuation of said value of the entropy of said virtual pixel, by using a procedure of directional interpolation.

78. The method of claim **72**, whereby said real value assigned to a said virtual pixel in said current field is equal to real value of said previous pixel and to real value of said next pixel.

79. The method of claim **72**, further comprising the step of:

(f) repeating steps (b) through (e) for a pre-determined plurality of additional said temporal interlaced sequences of three consecutive fields in said global input grid of frames featured in the streaming digital video input image signal, for generating a streaming digital video output image signal.

80. The method of claim **79**, further comprising the step of:

(g) displaying said streaming digital video output image signal on a display of a digital video image display device.

* * * * *

UNITED STATES OF AMERICA

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

CENTRAL DIVISION

- - -

HONORABLE MARIANA R. PFAELZER
UNITED STATES DISTRICT JUDGE PRESIDING

- - -

OPLUS TECHNOLOGIES, LTD., PLAINTIFF, VS. SEARS HOLDINGS CORPORATION, ET AL., DEFENDANT.	CV 12-05707-MRP(EX)

SCHEDULING CONFERENCE

LOS ANGELES, CALIFORNIA

JULY 24, 2012

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MR. OPATKEN: CERTAINLY.

THE COURT: ALL RIGHT.

NOW, WHAT HAVE YOU DISCUSSED WITH THE OTHER SIDE?

MR. OPATKEN: WITH THE OTHER SIDE, WE HAVE ENGAGED IN THE INITIAL CREATION OF THE SCHEDULING ORDER, WHICH WAS INITIALLY DRAFTED FOR THE NORTHERN DISTRICT OF ILLINOIS PATENT RULES. I DO NOT BELIEVE THAT WE'VE REALLY ENGAGED IN MUCH ELSE BEYOND THAT.

THE COURT: AND WHAT ABOUT -- WHAT ABOUT THE TWO PARTIES? ARE WE GOING TO HAVE SEARS AND VIZIO, BOTH?

MR. OPATKEN: NO. SEARS HAS BEEN -- ACCORDING TO THE NORTHERN DISTRICT OF ILLINOIS, HAS BEEN SEVERED FROM THE CASE AND STAYED.

THE COURT: RIGHT. RIGHT.

MR. OPATKEN: I SUPPOSE, BECAUSE SEARS IS THE LONE REMAINING DEFENDANT IN ANOTHER NORTHERN DISTRICT OF ILLINOIS CASE, THE JUDICIAL PANEL COULD BRING THEM BACK INTO THIS. I'D BE ENTIRELY SPECULATING AS TO THAT. BUT IF WE'RE MOVING FORWARD HERE, SEARS IS BASICALLY, AS I UNDERSTAND IT, NOT REALLY ON OUR RADAR.

THE COURT: ALL RIGHT. THAT'S FINE.

NOW, WHAT YOU'RE TALKING ABOUT HERE, IS THAT STILL -- ARE THEY STILL INFRINGING?

MR. OPATKEN: SEARS IS STILL INFRINGING, YES. SEARS IS -- ACCORDING TO OUR INFORMATION, SEARS IS STILL A

PROVIDER OF THE INFRINGING SETS, ALTHOUGH I'M NOT ENTIRELY CERTAIN WHICH OF THOSE SETS OR THE SCOPE OF THE INFRINGEMENT THAT SEARS WOULD BE INVOLVED WITH, BUT THEY WERE OFFERING TO SELL AND SELLING THE DEVICES OF VIZIO THAT HAVE BEEN PARTICULARLY ACCUSED THUS FAR.

13:45:42

THE COURT: IS VIZIO STILL MAKING THEM?

MR. OPATKEN: I DON'T KNOW, AS OF TODAY, IF VIZIO IS STILL MAKING THEM.

THE COURT: WELL, GIVE ME A GUESS.

13:45:56

MR. OPATKEN: MY GUESS WOULD BE THAT VIZIO IS STILL MAKING INFRINGING DEVICES. AS TO WHETHER OR NOT IT'S STILL MAKING THE DEVICES THAT WERE SPECIFICALLY IDENTIFIED IN THE COMPLAINT AT THIS DATE, I DON'T KNOW. THIS TECHNOLOGY MOVES SO QUICKLY.

13:46:11

THE COURT: IT CERTAINLY DOES.

MR. OPATKEN: NEW TV'S EVERY SIX MONTHS. NEW CELL PHONES EVERY THREE WEEKS. SO I DON'T KNOW ABOUT THE ONES THAT HAVE SPECIFICALLY BEEN ACCUSED AS TO WHETHER OR NOT THEY ARE STILL BEING PROVIDED BY VIZIO.

13:46:22

THE COURT: BUT YOU DON'T HAVE ANY INFORMATION THAT THERE ARE ANY MORE?

MR. OPATKEN: I DON'T WANT TO SAY THAT WE DON'T HAVE ANY OTHER INFORMATION. I, PERSONALLY, AM NOT AWARE OF -- I WOULDN'T BE ABLE TO PROVIDE OTHER MODEL NUMBERS.

13:46:32

THE COURT: ALL RIGHT. THEN LET ME PUT IT

DIFFERENTLY. YOU'RE SUING FOR PAST -- THE PAST?

MR. OPATKEN: IF THOSE TV'S ARE NO LONGER BEING SOLD, YES, THEY WOULD BE ONLY PAST DAMAGES. BUT IF DISCOVERY WERE TO UNTURN, FOR EXAMPLE, OTHER DEVICES THAT ARE INFRINGING IN A SIMILAR MANNER THAT ARE CURRENTLY BEING SOLD, WE'D OBVIOUSLY BE LOOKING FORWARD AND LOOKING TO FUTURE DAMAGES AS WELL.

THE COURT: BUT YOU DON'T KNOW. YOU DON'T KNOW OF ANY MORE?

MR. OPATKEN: AT THIS TIME I, PERSONALLY DO NOT, NO.

THE COURT: ALL RIGHT.

PLEASE, MAY I JUST PROBE THIS A LITTLE BIT WITH YOU?

MS. PRUETZ: YES, YOUR HONOR. WITH RESPECT TO SEARS, SEARS STOPPED SELLING VIZIO TELEVISIONS MORE THAN TWO YEARS BEFORE --

THE COURT: THAT'S WHAT I UNDERSTAND.

MS. PRUETZ: AND AS FAR AS THE PRODUCTS THEY'VE ACCUSED OF INFRINGEMENT, THOSE PRODUCTS ARE -- HAVE EVOLVED.

THE COURT: YES. AND SO FROM SEARS' STANDPOINT, THERE'S NOTHING MORE.

MS. PRUETZ: WELL, YES. AND SEARS HAS BEEN STAYED PENDING THE OUTCOME OF THIS CASE.

THE COURT: ALL RIGHT.

THE COURT: YOU MEAN YOU'D LIKE TO HAVE DISCOVERY BEFORE WE HAVE THE CLAIM CONSTRUCTION.

MR. OPATKEN: ABSOLUTELY, YOUR HONOR. THE FED CIRCUIT HAS RECOGNIZED IN MULTIPLE OCCASIONS THAT THE CLAIMS SHOULD BE CONSTRUED IN LIGHT OF THE INFRINGING DEVICES. SO TO HAVE A CLAIM CONSTRUCTION IN A VACUUM HAS BEEN FROWNED UPON IN THE PAST AND WE WOULD RECOMMEND --

THE COURT: LET ME TELL YOU, COUNSEL, JUST ONE THING. YOU PROBABLY ALREADY KNOW EXACTLY HOW THE INFRINGEMENT HAS TAKEN PLACE, DON'T YOU?

MR. OPATKEN: WELL, WITH ONLY PUBLICLY AVAILABLE INFORMATION. I WOULD NOT USE THE WORD "EXACTLY."

THE COURT: OH, WELL, NOW COME ALONG. WE'RE NOT TALKING ABOUT THINGS THAT PROBABLY ARE IN THE WORKS NOW.

MR. OPATKEN: I'M SORRY. I DON'T FOLLOW, YOUR HONOR.

THE COURT: WHAT I'M SAYING TO YOU IS IT DOESN'T SEEM TO ME THAT VIZIO -- ARE YOU MANUFACTURING THOSE PARTICULAR THINGS NOW?

MS. PRUETZ: YOUR HONOR, VIZIO DOESN'T MANUFACTURE --

THE COURT: NO, I UNDERSTAND THAT.

MS. PRUETZ: -- THEY ASSEMBLE. BUT THE PRODUCTS HAVE CHANGED BECAUSE THESE ARE TV'S FROM A FEW YEARS AGO.

THE COURT: THAT'S WHAT I THOUGHT.

MS. PRUETZ: AND I WOULD ADD, IN TERMS OF PUBLICLY AVAILABLE INFORMATION, I CERTAINLY WOULD HOPE THAT THE PLAINTIFF, OPLUS, AT LEAST BOUGHT A COUPLE OF THESE TV'S AND LOOK AT THEM BEFORE THEY ACCUSED THEM OF --

14:04:18 THE COURT: ONE WOULD HOPE SO, BUT YOU NEVER KNOW.

MS. PRUETZ: AND FAR AS DISCOVERY, I MEAN WE WOULD BE FINE TAKING CLAIM CONSTRUCTION DISCOVERY FIRST AND LEAVING EVERYTHING ELSE --

THE COURT: BUT I DON'T EVEN KNOW WHAT --

14:04:31 MS. PRUETZ: I'M NOT SURE HOW MUCH WE NEED ON THAT.

THE COURT: I'M ATTEMPTING TO FIND OUT WHAT CLAIMS WE'RE TALKING ABOUT AND WHAT MIGHT BE CONSTRUED, NEED TO BE CONSTRUED.

CAN YOU GIVE ME AN EXAMPLE?

14:04:51 MS. PRUETZ: LET ME JUST GET MY GLASSES.

THE COURT: HERE'S THE QUESTION. ASSUMING THAT I WOULD DO NO MORE THAN 10 CLAIMS -- AND I DON'T SEE ANY NEED FOR MORE THAN FIVE -- WHAT, FOR EXAMPLE, WOULD YOU WANT CONSTRUED?

14:05:22 MS. PRUETZ: WELL, LOOKING AT CLAIM 56 -- AND THIS IS THE THING -- WE HAVE HAD NO CONVERSATION WITH THEM. I DON'T KNOW HOW THEY DEFINE THE WORD "ENTROPY." I DON'T KNOW WHAT THEY REGARD AS A "REALTIME STREAMING DIGITAL VIDEO IMAGE SIGNAL." I KNOW WHAT WE MIGHT THINK IT IS, BUT I DON'T KNOW

14:05:42 IF THEY AGREE WITH THAT DEFINITION. AND, YOU KNOW, THERE'S

UNITED STATES OF AMERICA
UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

- - -

HONORABLE MARIANA R. PFAELZER,
UNITED STATES DISTRICT JUDGE PRESIDING

- - -

OPLUS TECHNOLOGIES, LTD., PLAINTIFF, VS. SEARS HOLDING CORPORATION, VIZIO, INC., et al., DEFENDANTS.	CERTIFIED COPY CV 12-05707 R

REPORTER'S TRANSCRIPT OF PROCEEDINGS
WEDNESDAY, FEBRUARY 27, 2013
A.M. SESSION
LOS ANGELES, CALIFORNIA

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electrical engineering and understand. So the level is a little more complex, which is likely why there is so much description in this patent about how -- about defining the scope of what is actually claimed and how to do this.

THE COURT: What is actually claimed?

MS. SZPONDOWSKI: I guess I don't understand your question. I mean, outside of what the claim language says is claimed.

THE COURT: Let me ask you the question differently. Is your claim narrow?

MS. SZPONDOWSKI: I think it is narrow.

THE COURT: How is it narrowed?

MS. SZPONDOWSKI: There -- if you look at Claim 56, even just looking at this determining the entropy step, there are four very specific steps as to what has to happen in order to --

THE COURT: That's true. Well, I mean, let's just say they are specific enough for the purpose of this argument. When you get to the end, what?

You take the four steps and then what?

MS. SZPONDOWSKI: You get to the end of the claim? Or --

THE COURT: What I'm asking you is what indeed is the end of the claim? The use of the claim,

the purpose of the claim.

MS. SZPONDOWSKI: The end of the claim is correcting an error. Which that's what the patent talks about at length at the beginning -- this is kind of getting into the 101 argument a little bit. But the patent talks at length about what problems are being tried -- trying to solve in the industry. The claims are -- and they're directed towards this method of correcting an error.

So --

THE COURT: Well, there are other techniques for doing that, aren't there?

MS. SZPONDOWSKI: Absolutely. And this is just one technique.

Okay. I will move on to the next term, the regional sum of neighborhood weighted distances, if that's --

THE COURT: Yes. I have interest in that.

MS. SZPONDOWSKI: Now, this particular -- this term -- now, I think this again goes back to what do we mean by definiteness.

Would a person of ordinary skill in the art understand what is meant by regional sum of any local neighborhood weighted distances.

And our expert says, yes, he would.

it in this patent, in either of these patents, for all the reasons we discussed.

THE COURT: Thank you both sides for a very interesting argument.

I don't think I have anything else.

Can you tell me -- one thing I would like to know: What do you think Vizio is doing that infringes?

MS. SZPONDOWSKI: It's pertaining to the functionality in their televisions, video processing that's happening in their televisions.

THE COURT: I know that, it's pertaining to that.

MS. SZPONDOWSKI: Right.

THE COURT: But what are they doing specifically?

MS. SZPONDOWSKI: I guess I don't --

THE COURT: They are correcting errors with this technique?

MS. SZPONDOWSKI: Yeah. And the deinterlacing relating to the '842.

THE COURT: Using this technique?

MS. SZPONDOWSKI: We believe so.

THE COURT: Because there are other techniques.

MS. SZPONDOWSKI: There are.

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

WESTERN DIVISION

HONORABLE MARIANA R. PFAELZER, JUDGE PRESIDING

OPLUS TECHNOLOGIES, LTD., Plaintiff, vs. SEARS HOLDING CORPORATION, VIZIO, INC., Defendants.	NO: CV 12-5707-MRP

REPORTER'S TRANSCRIPT OF PROCEEDINGS

Los Angeles, California

Friday, June 7, 2013

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mean by gotten off on the wrong foot?

THE COURT: I mean we have gotten off on the wrong foot about all of this, all of us communicating with each other. I don't think that I've made myself clear; though, I tried to. So you go ahead.

MR. KOOLE: Your Honor, Vizio filed this motion because Oplus essentially ignored the April 3rd order and subpoenaed itself for files that it had in its possession as a result of a retention clause in a previous case for a different Plaintiff against Vizio.

THE COURT: Yes, I know that.

MR. KOOLE: This is -- as shown in Vizio's papers, this is in clear violation of the protective order that was entered in that case, which states --

THE COURT: I've read it.

MR. KOOLE: As Your Honor is well aware, it says that they cannot use this information outside of that action.

THE COURT: Well, actually, I never had this happen before. So I understand what you mean about the protective order. I -- it never occurred to me that anybody would ever subpoena their own files from another case. So we'll just -- I understand that.

MR. KOOLE: So Vizio's motion was brought under the terms of the protective order, which stated that we

rules or seen those rules yet, Your Honor.

THE COURT: -- from the North District of California.

MR. OPATKEN: I'm aware of the Northern District of California patent rules, Your Honor.

THE COURT: Well, I have generally sent out an order saying that these parts of the Northern District rules apply here, and I am telling you that I don't think you would have received that.

MR. OPATKEN: I agree. I don't believe we've received that, Your Honor.

THE COURT: But you did receive our order telling you to restate the infringement contentions?

MR. OPATKEN: Yes, the Docket 121.

THE COURT: And you didn't do that, did you?

MR. OPATKEN: Well, the order doesn't say that the contentions needed to be amended. It just said that the --

THE COURT: They aren't leer.

MR. OPATKEN: That they aren't clear in the Vizio letter, that there's a number of questions that, if they were to be answered, would provide clarify and frame the scope more appropriately.

THE COURT: That's right.

MR. OPATKEN: And the letter that was sent --

off the cuff -- I believe May 15th or so, we believe, does that to the extent that it was necessary.

THE COURT: Well, I am going to send you an order because a letter doesn't bind you to anything, and we have to have binding infringement contentions that satisfy each of the particular courts that are handling the patent cases before we let you go on with discovery.

Did I make that clear to you just now?

MR. OPATKEN: Yes, I understand that, Your Honor.

THE COURT: Well, that's the rule and you can't -- the letter is much, much clearer, than the -- than the contentions were. I would have thought you'd work this all out.

MR. OPATKEN: That would have been nice, Your Honor; but, again, we --

THE COURT: Well, you keep using the word "nice." Nice does not come into what we're talking ing about here. It doesn't. It doesn't even apply. I'm just trying to do something rationale with the litigation.

Now, first of all, you're going to have to take your letter and change your infringement contentions so that it's very clear on the record what you are contending; is that clear? I'll send you an order

MR. OPATKEN: Making clear of the infringement contentions.

THE COURT: But what -- what is the Court supposed to do about your letter? Did the Court get a copy of that letter from you?

MR. OPATKEN: I don't believe so, Your Honor, but I didn't realize the Court received copies of the infringement contentions in this case without us not having local patent rules.

THE COURT: Well, we know about those contentions.

Mr. Koole.

You're not going to -- you're not going to be able to use the material that's in your file that you subpoenaed from yourself.

MR. KOOLE: Pardon me, Your Honor?

THE COURT: No, no, I'm talking to him.

MR. OPATKEN: Okay. So -- but we have a number of outstanding document requests that Vizio has refused to comply with including requests that were specifically stated they would provide documents after the entry of the protective order. I personally negotiated the protective order with opposing counsel over numerous months. If they don't have -- now, they said, after entry of the protective order, "We have no documents."

in litigation.

THE COURT: Subpoenaing your own files? Your law firms own file in another case?

MR. KNEAFSEY: I suppose I just view it as a way of giving notice to the other side of what you'd like to do.

THE COURT: Did you --

MR. KNEAFSEY: We understand the Court.

THE COURT: This is childish. This is really childish, and I -- I can't condone it. I don't condone it no matter how hard they had litigated this case. It should have been worked out. You can't go around subpoenaing files that are in the -- that you have. You can't do that. I think most anybody would find an objection, any judge would.

Now, the matter that you are citing in San Diego is an entirely different thing. You went around the country trying to figure out who had what from other litigation that might help you in your own case. That's not like going to your own files in one case that is subject to a protective order and subpoenaing your own files in order to use them in this case, is it? It isn't the same thing.

MR. KNEAFSEY: I respectfully --

THE COURT: Disagree?

THE COURT: All right. Now, let me ask you something: You've heard this exchange, both of you, do you think there's any way to work this out --

MR. OPATKEN: I think, Your Honor --

THE COURT: -- aside from sending them to Illinois?

MR. OPATKEN: Your Honor, the Illinois thing -- if Oplus is entitled to discovery from Vizio itself, then there's no need for Illinois.

THE COURT: I didn't say your entitled to discovery. I didn't say that. So barring my saying that to you, is there -- is there anything that the Court might order you to do that would be in aid of this situation, or can you figure it out for yourself?

MR. OPATKEN: Your Honor, it comes back to is this a billion case, or is this a thousand dollar case? And Vizio keeps saying it's a zero-dollar case, but it's conduct from the beginning of this litigation that suggests that it's far greater than that. They're talking -- we've asked and there's a motion filed to extend the expert discovery. There's a meet and confer, and that was flat out refused sixty days, and thirty days was refused as well. Why? Because they want to file a second motion for summary judgment. Counsel said it's expensive, and they keep spending -- if this was a

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

WESTERN DIVISION

THE HON. JUDGE MARIANA R.PFAELZER, JUDGE PRESIDING

OPLUS TECHNOLOGIES, LTD.,	)
	)
Plaintiff,	)
	)
vs.	) **NO. LA12-CV-05707-MRP**
	)
SEARS HOLDING CORPORATION, VIZIO, INC.,	)
	)
Defendant.	)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

Telephonic Conference

Los Angeles, California

Tuesday, June 25, 2013

LISA M. GONZALEZ, CSR No. 5920, CCRR
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Los Angeles, California 90012
213.894.2826; csrlisag@aol.com

Los Angeles, California, Tuesday, June 25, 2013

1:30 p.m.

-o0o-

THE CLERK: Item no. 1, CV-12-5707, Oplus Technologies, LTD., versus Sears Holding Corporation, Vizio, Inc.

MR. GASEY: Your Honor, it's Art Gasey. And with me, Paul Gibbons and Gabriel Opatken for plaintiff, Oplus.

MS. PRUETZ: Good afternoon, Your Honor. This is Adrian Pruetz and Charles Koole from Glazer Weil for Vizio.

MS. FRIEND: Good morning, Your Honor. Michelle Friend from Kneafsey & Friend on behalf of plaintiff, Oplus.

THE COURT: Fine. I am satisfied with the infringement contentions, and I got the communication, the filing from Ms. Pruetz. I presume that you are on track now; are you?

MR. GASEY: Well, Your Honor, we have attempted to abide by the existing case management order; however, as was the subject matter of some of the discovery disputes we have ongoing, we haven't received any documents from the defendants. No damages' documents of any kind and no infringement documents. And that was why we had the pending motion to extend the expert discovery schedule and why, frankly, Your Honor, we just haven't been able to file an expert damages' report; so we have abided by the schedule,

infringement contentions. From Vizio's point of view, they don't say a thing.

THE COURT: I know you feel that.

MS. PRUETZ: We do. And we feel that they mentioned some broad technologies that don't tie up. They don't even relate to the elements of the claim. They're just going to accuse every television that has one of these chips in it without any further information, without ever going to the chip makers and actually finding out how these chips work. And that's how they would like to proceed to trial in this case.

Now that won't affect our motions for summary judgment.

THE COURT: No, it won't. It will not. It won't affect them.

MS. PRUETZ: No.

THE COURT: So you're free to go ahead and you're free on the part of Oplus to make any motions that you want of any kind also.

MR. GASEY: Thank you, Your Honor.

THE COURT: And so we'll just see. At the present time you have a much more satisfactory set of infringement contentions than you did before, and the export -- expert reports are going on is my chief concern; and that you're headed in some direction to find out what it is you want to

have. If you want to make a motion of any kind on their responses because you think they're inadequate, you know you can do that.

MR. GASEY: On Oplus's part, we understand, Your Honor, and depending upon what kind of information we get from Vizio specifically with respect to identification of chips, that may well occur.

THE COURT: Maybe.

MR. GASEY: The one -- the one -- I guess two additional points I think I should probably raise briefly for sake of clarity. One is, as additional information becomes available under Rule 26, Your Honor, we may feel compelled to go ahead and supplement the existing expert report that we have, based upon information that had been withheld previously by Vizio.

The second point is, you know, depending upon what we may receive from Vizio by way of further documentation, we may need to seek relief of taking a deposition of Vizio based upon documentation which wasn't previously produced, which was previously withheld. And I don't know if that's going to be the case because obviously we don't know yet what if any information we're finally going to get from Vizio, but I just wanted to go ahead -- in the matter of full disclosure, to go ahead and front that at this point, Your Honor.

UNITED STATES OF AMERICA

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

CENTRAL DIVISION

\- - -

HONORABLE MARIANA R. PFAELZER
UNITED STATES DISTRICT JUDGE PRESIDING

\- - -

OPLUS TECHNOLOGIES, LTD., PLAINTIFF, VS. SEARS HOLDING CORPORATION, ET AL., DEFENDANT.	CV 12-05707-MRP

MOTIONS HEARING

LOS ANGELES, CALIFORNIA

SEPTEMBER 9, 2013

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THE COURT: ALL RIGHT. DO YOU KNOW THE AMOUNT OF THAT? HOW MANY TIMES THEY TURNED IT ON OR WHETHER, INDEED, YOUR PATENT WAS BEING INFRINGED BY THE CHIP THAT WAS IN IT?

MR. GASEY: I DON'T KNOW THE NUMBER OF TIMES; HOWEVER, I DO KNOW THAT IN THE ABSENCE OF BEING ABLE TO RECEIVE AND PROCESS AN INTERLACE SIGNAL WHICH WOULD INVOLVE THE USE OF, FOR INSTANCE, THE '842 TECHNOLOGY, THAT THERE WOULD NOT BE THE ABILITY TO OBTAIN FCC VERIFICATION. THERE WOULDN'T BE THE ABILITY TO SELL TELEVISION SETS IN THE UNITED STATES.

THE COURT: ALL RIGHT. LET ME ASK YOU ANOTHER QUESTION. I JUST WANT TO KNOW HOW YOU'RE SURE THAT YOUR PATENTS ARE BEING INFRINGED?

MR. GASEY: WE ARE SURE OUR PATENTS ARE BEING INFRINGED BECAUSE WE'VE HAD OUR EXPERTS GO AHEAD AND USE AND OPERATE THE TELEVISION SETS --

THE COURT: AND THEY'VE TOLD YOU THAT YOU COULDN'T HAVE THAT EFFECT IF YOU DIDN'T VIOLATE THE PATENTS.

MR. GASEY: I'M SORRY. I DIDN'T UNDERSTAND.

THE COURT: WELL, WHAT I'M SAYING TO YOU IS THEY COULD, JUST BY TURNING IT ON AND LOOKING AT THE CHIPS OR THE MANUALS -- DESCRIBING WHAT HAPPENS WITH THE TELEVISION -- THEY CAN JUST BY LOOKING AT THAT TELL THAT YOUR PATENTS HAVE BEEN INFRINGED.

MR. GASEY: I'M SORRY. I DON'T MEAN TO BE --

THE COURT: HOW DO YOU KNOW THAT YOUR PATENTS ARE BEING INFRINGED IN THOSE CIRCUMSTANCES THAT YOU'RE DESCRIBING?

MR. GASEY: WELL, TO A CERTAINTY, WE DO NOT. IT IS OUR EXPERT'S BELIEF BASED UPON HIS --

THE COURT: AND YOUR EXPERT HAS DONE THAT HOW?

MR. GASEY: HE HAS GONE AHEAD AND RUN THROUGH TYPICAL VIDEO SIGNALS SUCH AS WHAT'S --

THE COURT: NOW, I'M GOING TO TRY IT AGAIN. AND IT'S MY FAULT, NOT YOURS.

SO WHAT I'M SAYING TO YOU IS: HE NOW CAN TELL YOU THAT ALL THE STEPS IN THE PATENT HAVE BEEN INFRINGED. FOR EXAMPLE, IN CLAIM 56, HE CAN TELL YOU NOW THAT ALL THOSE STEPS HAVE BEEN IN USE?

MR. GASEY: IT IS HIS BELIEF THAT, YES, THOSE STEPS ARE MET THROUGH THE PRACTICING OF THE 3:2 PULLDOWN --

THE COURT: AND THAT IS DONE THAT WAY AS DESCRIBED IN THE PATENT?

MR. GASEY: IT IS HIS BELIEF THAT, YES, THAT MORE LIKELY THAN NOT, THAT IS HOW --

THE COURT: WELL, YOU CAN DO THAT "MORE LIKELY THAN NOT."

MR. GASEY: WELL, IT IS HIS EXPERT OPINION THAT THAT IS -- THAT IS THE MOST LIKELY WAY IN WHICH THAT -- THOSE ERRORS, THOSE MOIRÉ ERRORS THAT ARE SHOWN IN THE SCREEN

SHOTS --

THE COURT: BUT IT COULD BE DONE SOME OTHER WAY, COULDN'T IT?

MR. GASEY: CONCEIVABLY, YES.

THE COURT: YOU SAID THAT.

MR. GASEY: YES.

THE COURT: SO YOU DON'T --

MR. GASEY: THAT'S OUR INVALIDITY EXPERT THAT SAID THAT, YOUR HONOR, YES.

THE COURT: GO ON.

MR. GASEY: WITH RESPECT TO THE QUESTION OF WE DON'T KNOW HOW THE INFRINGING TECHNOLOGIES WORK. WHAT WE HAVE RELIED UPON AND WHAT WE HAVE FOUND ARE THINGS SUCH AS THE STATEMENTS OF ONE OF THE THREE FOUNDERS OF VIZIO, WHEREIN SHE SAID, "WE HAVE SOUGHT OUT, WE HAVE BROUGHT IN THIS TECHNOLOGY FOR USE WITH VIZIO TELEVISION SETS. WE HAVE PUT THEM ON NOTICE SHOWING HOW THOSE -- THAT THE OPERATION OF THOSE TECHNOLOGIES MEETS EACH AND EVERY ELEMENT, EACH AND EVERY STEP," RATHER -- EXCUSE ME -- "OF THE ASSERTED CLAIMS. THEY NOW HAVE THAT KNOWLEDGE. IF THEY HAVE CHOSEN TO IGNORE IT, IT HAS BEEN A WILLFUL IGNORANCE. IT HAS BEEN THROUGH THEIR DECISION NOT TO, FOR INSTANCE, GO AHEAD AND READ THE PATENT IN SUIT. AND THAT UNDER *COMIO* (PHONETIC) -- EVEN IF THERE WAS A GOOD-FAITH BELIEF THAT, IN AND OF ITSELF, IS NOT DISPOSITIVE OF THE MATTER OF WHETHER OR NOT THERE CAN BE

DISPUTE AND THAT PROVIDES AN INDEPENDENT BASIS FOR INVALIDITY, FOR LACK OF WRITTEN DESCRIPTION, AND NON-ENABLEMENT.

THE COURT: ALL RIGHT. NOW, LET'S JUST GO BACK TO INFRINGEMENT FOR A MINUTE.

HAVE WE RESOLVED THE QUESTION OF WHAT INFRINGEMENT IS BEING ASSERTED HERE BEFORE THE DATE OF THE COMPLAINT?

MR. GASEY: SINCE IT'S OUR BURDEN --

THE COURT: WELL, I JUST WANT TO ASK HER FIRST, AND THEN YOU.

MS. PRUETZ: WELL, PRIOR TO DECEMBER 2011 WHEN THE COMPLAINT WAS FAILED, OPLUS CANNOT ASSERT INDIRECT INFRINGEMENT AS A MATTER OF LAW BECAUSE VIZIO HAD NO KNOWLEDGE OF THE PATENTS.

THE COURT: I HAVE THAT.

MS. PRUETZ: AND UNDER GLOBAL TECH -- I MEAN THAT'S JUST BLACKLETTER LAW. SO AFTER THIS MOTION WAS FILED, OPLUS SENT US A LETTER SAYING THEY WERE GOING TO ASSERT INDIRECT INFRINGEMENT PRIOR TO DECEMBER 2011. I DON'T THINK THEIR PAPERS CALLED THAT ISSUE OUT BECAUSE IN THEIR PAPERS THEY SAID THEY WEREN'T GOING TO ASSERT ANY ACTS OF INFRINGEMENT.

THE COURT: WELL, THAT'S MY POINT.

MS. PRUETZ: AND FOR DIRECT INFRINGEMENT, I THINK THE ISSUE THAT MR. GASEY HAS DISCUSSED, AND I, YOU KNOW -- CERTAINLY HE NEEDS TO CLARIFY THIS. BUT THE FACT IS THAT IF

THEIR ONLY CLAIM PRIOR TO DECEMBER 2011 IS FOR VIZIO'S USE OF THE ACCUSED TELEVISIONS SO DE MINIMIS IT SHOULDN'T TAKE THE TIME OF THIS COURT OR ANYONE. SO THEY DID -- I THOUGHT, IN THEIR OPPOSITION THAT BECAUSE THAT WAS ALL THAT WOULD BE LEFT FOR THEM TO ASSERT, THAT EVEN PUTTING ASIDE THE MERITS OR LACK OF MERITS THAT WE SEE OF THOSE CLAIMS, THERE WAS NO POINT. AND I THINK MR. GASEY HAS CORROBORATED THAT HERE, THAT IF THAT'S WHAT THEIR CLAIM IS REDUCED TO, HE WOULD JUST WITHDRAW THE CLAIMS. WE THOUGHT --

THE COURT: WELL, I DON'T -- THAT'S MY PROBLEM. IT ISN'T WITHDRAWN, IT'S THERE.

MS. PRUETZ: THE DIRECT INFRINGEMENT CLAIM?

THE COURT: YES.

MS. PRUETZ: IS THAT OPLUS' POSITION?

THE COURT: WELL, I HAVE TO --

MR. GASEY: YOUR HONOR?

THE COURT: YES. PLEASE. PLEASE.

MR. GASEY: I DIDN'T WANT TO STEP ON MRS. PRUETZ' TIME. WE ARE LARGELY IN AGREEMENT, ALTHOUGH I DON'T NECESSARILY AGREE WITH THE CHARACTERIZATION BY MS. PRUETZ, IS WE CERTAINLY DON'T ACCUSE ANYBODY OF INDIRECT INFRINGEMENT FROM BEFORE DECEMBER OF 2011. WE CAN'T. WE'RE NOT GOING TO.

WE HAVE ACCUSED THEM OF DIRECT INFRINGEMENT FOR THE TIME PERIOD PRIOR TO DECEMBER 2011; THAT IS THEIR USE, THEIR DIRECT INFRINGEMENT. HOWEVER, IF IT TURNS OUT, AS I'M

BEGINNING TO HEAR THINGS RELATED TO A STATEMENT FROM VIZIO, THAT THEY HAVE NO SALES OF PRODUCTS USING DCDI, MDDI OR HQV SUBSEQUENT TO THE FILING OF THEIR COMPLAINT IN 2011 --

THE COURT: THAT'S WHAT THEY SAID.

MR. GASEY: IF THEY HAVE NO SALES OF ANY PRODUCTS WITH THOSE THREE TECHNOLOGIES, THEN WE WOULD BE WILLING TO DROP OUR DIRECT INFRINGEMENT CLAIM BECAUSE WE DON'T WANT TO BURDEN THE COURT WITH TRYING SOMETHING THAT --

THE COURT: WELL, I'M NOT SAYING YOU HAVE WITHDRAW ANYTHING.

I'M ASKING YOU REALLY, MR. GASEY, WHAT IS WITHDRAWN?

MR. GASEY: RIGHT NOW, WE HAVE NO CLAIMS FOR INDIRECT INFRINGEMENT PRIOR TO DECEMBER -- I'M FORGETTING THE EXACT DATE -- 2011. MATTER OF FACT, I THINK PRETTY EARLY ON WE MADE SURE --

THE COURT: AND DO YOU HAVE DIRECT INFRINGEMENT --

MR. GASEY: YES.

THE COURT: -- AS TO THE USES?

MR. GASEY: THAT'S CORRECT, YOUR HONOR.

THE COURT: NOW IS THERE ANYTHING I HAVEN'T TAKEN INTO CONSIDERATION ON DIRECT INFRINGEMENT? WHAT HAPPENS ABOUT DIRECT INFRINGEMENT IF YOU'VE GOT SOME SORT OF HELP ON THE DISCOVERY?

MR. GASEY: IF WE FOUND SUBSEQUENT SALES FOR -- OF

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

WESTERN DIVISION

THE HON. JUDGE MARIANA R. PFAELLZER, JUDGE PRESIDING

OPLUS TECHNOLOGIES, LTD., Plaintiff, vs. SEARS HOLDING CORPORATION, et al. Defendant.	NO. LA 12-CV-05707-MRP

REPORTER'S TRANSCRIPT OF PROCEEDINGS

Los Angeles, California

Monday, December 9, 2013

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APPEARANCES:

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FOR THE DEFENDANT: **GLASER, WEIL**
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MR. NIRO: I have not, Your Honor.

THE COURT: Instead of our looking at the sections --

MR. NIRO: Yes, Your Honor.

THE COURT: -- let's address what happened in the case.

MR. NIRO: Yes, Your Honor.

We will do that --

THE COURT: Because, Mr. Niro, I want to make this representation to you. I don't give attorneys' fees. I don't think you could find a case in which I've done that. I'm well aware that you can do it, and I have seen many instances where attorneys have come in and behaved in a way that I thought was not appropriate, but I have not granted attorneys' fees.

Nevertheless, I understand exactly the circumstances under which you can do it.

Now, the question between you as the named partner -- and you have a very well known law firm -- the question is: Do you think, from looking at everything, that there was vexatious conduct?

MR. NIRO: I think not, Your Honor, and I -- you're right. I have not been involved substantively in this case. This is my first appearance before this court in this case, and I'm here because it's very important,

obviously, to -- to our law firm.

THE COURT: Well, then -- well, then, I want to say -- I'm going to make an observation to you.

MR. NIRO: All right, Your Honor.

THE COURT: Mr. Opaken, though I tried with him to be as courteous as I could, didn't, in this court, behave in a fashion that I approve of. I want to tell you that he was extremely arrogant.

Now, whether he was vexatious or not is another problem altogether, but he certainly gets a high award from me for being arrogant and aggressive. I don't think you would have approved of it.

MR. NIRO: I'm sure I would not, Your Honor.

THE COURT: Well, I wish to tell you that that is not what I expect from patent lawyers, and I have had in my time on the court enormous numbers of patent cases. In fact I make a point of taking patent cases. He stepped over the line in terms of courtesy, certainly.

MR. NIRO: Well, that's -- that's an unfortunate thing, and I will address that personally --

THE COURT: Well, he was definitely not what I expect from a law firm of your standing.

MR. NIRO: We've been doing this -- I've been doing this for over 40 years and --

THE COURT: I know you have.

MR. NIRO: -- and I have two sons that work with me in my law firm.

THE COURT: I know that too.

MR. NIRO: And I have to tell you, Mr. Opaken is an associate in the firm. He -- and I'm not going to apologize for him because I don't know --

THE COURT: No, because you were not here. You can't do that.

MR. NIRO: He was -- he was -- if Your Honor says he was out of line, I take that.

THE COURT: No, what I said was --

MR. NIRO: He was aggressive.

THE COURT: I said he was arrogant.

MR. NIRO: Arrogant. Okay.

THE COURT: And that's an observation that I don't make very often either.

I want you to know that -- that I'm trying hard in this situation not to use the fact of his aggressiveness against your law firm, but I do tell you, if I were disposed to criticize lawyers, I'd criticize him.

Now, he may have thought -- I reflected on this a few times.

He may have thought that he was in just a court on the West Coast that didn't know anything.

MR. NIRO: That would be a big mistake.

THE COURT: He certainly acted that way.

Now, I've stated that not because I came out here disposed to grant attorneys' fees. I've said that to you because you are -- you have a reputation, which is not a bad reputation, and I reflected when he was here on just what -- what could have motivated his behavior.

In fact, I just looked at part of the transcript, which I never do, of one of the hearings in which I told him at the beginning that we seem to have gotten off on the wrong foot. There's no way -- there was no way I could try with him to be reasonable. I don't know. Perhaps he just thought he was in front of someone who was senior and it didn't make any difference, but it did make a difference. And the whole thing -- everything that was conducted was on that level.

First, we wrote an order, which we never do, pointing out why the infringement contentions were not adequate. Well, that was met with contempt on his part.

So I will cut it off right there because I could elaborate further. I could show you some places in the transcript where seasoned lawyers don't come in here and say things like that.

For example -- and then I'll leave it -- seasoned lawyers do not say to me, in effect, "Well, we just want to know if there's enough money involved in this for us to go

THE COURT: No, no. You don't have to be here on every case you have --

MR. NIRO: You recognize some of them here. I mean Art Gasey, Paul Gibbons, Kara Szpondowski --

THE COURT: Yes.

MR. NIRO: -- and I think they've all appeared before you. I hope that none of them conducted themselves in a way that was --

THE COURT: In any event, I am not intending to dwell on it any further. I'm just telling you that there is more to this, perhaps, then just the basis, the statutory basis for attorneys' fees. I just do not grant them. However, I might in this case because it was -- I haven't made up my mind yet, but I will tell you it was, to some degree, vexatious.

I don't -- I didn't mean to interrupt you with this long harangued, but I do want to hear what you say about what opposing counsel has said.

MR. NIRO: I do want to address that, Your Honor. I think the one point that you've made, which is important, obviously, to me because it's -- it's -- I like to say to the people in our law firm, "You carry a sweatshirt around with our name on it."

THE COURT: You do. That's right.

MR. NIRO: If you go out and do something that's

To address their points -- and there's something fundamental here that I hope Your Honor will take into account. We went about this case, as we go about every other case, with a very detailed pre-filing investigation. We prepared claim charts to be certain that there was a basis for infringement. Contrary to what counsel said, we were clear that we were charging use of the method claims. There is correspondence and -- and Kara was responsible for some of it -- in which we said unequivocally: It is use that we charge.

As to Sears -- and I think there's a -- there's a very, very important decision of Judge Wright just a few courtrooms away -- and he said -- and this was in October of this year. He said, you know -- this was a case interestingly, Your Honor, parallels this case. New Wave won -- they were the defendant -- and they won the case on a motion for summary judgment like happened here, and then they asked for attorneys' fees. Not 1.2 million, 86,000, and he said no, because, number 1, he said -- and this was the Digitech case. He said, you can't just get fees because you call somebody a troll or an MPE and, indeed, Chief Judge Rader has made that abundantly clear.

THE COURT: He has. That's true.

MR. NIRO: And he said, "You can't do that. It's wrong. It's not the American system to categorize people.

Look at conduct. Don't look at the character of the person involved," and he said, "I'm not going to award them here because you don't meet the criteria. I don't see the vexatious conduct permeating the case."

Now, in this case, Your Honor, if you back up to what was the basis for them prevailing in this case were two things that happened.

Number one, Your Honor granted summary judgment of anticipation as to one of the patents based upon the Simonetti (ph) prior, which they knew about and applied and told us about one year before they filed a motion for summary judgment. If that was invalidating prior art -- and I like to believe defense counsel hopefully behaves the way we do, and that is if they have a position, tell us about it, and if it's meritorious that case will come to an end, if I'm involved. They didn't do that. They waited one year, spent a million dollars, and then they filed a motion for summary judgment. They say there was no infringement because they didn't sell anything, but if they didn't sell anything, they knew they didn't sell anything the day this complaint was filed. We didn't have to go through a year of discovery. We didn't have to go through a judicial panel of multi-district litigation. I want to stop right there.

They criticize us for going to the judicial panel of multi-district litigation. There were three cases. One

There was nothing wrong in suing Sears. Sears is the vehicle for the sale of Vizio products. They have showrooms, they bring people in. And these are expensive TVs. People don't walk in and just buy them without seeing them, watching them, demonstrating them, using them, right on Sears' facility.

So that was an appropriate thing, not an inappropriate thing.

I commend to the Court's attention Judge Otis Wright's decision because it is recent. It's October of this year. And it's right on point. And he denies the effort to impose sanctions for vexatious conduct simply because they lost the case.

I won't burden the court further with what Chief Judge Rader said but, in essence -- when I read page 24 of their brief -- it's painful. They say unequivocally -- I want to read it to the court because it -- it says: The law firm of Niro, Heller & Niro, not Gabe Opaken, the firm, is the true troll behind the baseless case and the architect of the litigation misconduct described therein.

They call us a troll. They say we're the architect. We're the mastermind. We're the bad guys. The law firm, not a particular lawyer.

And when you read their brief -- briefs -- 266 times -- my eyes were getting blurry looking at -- "Oplus

counsel," "Oplus counsel," "Oplus counsel." More than five times per page that they attack our law firm. Not Oplus, the client, under 285 or inherent powers but our law firm. And not a particular individual but the firm, all of its lawyers, everyone.

The case is not objectively baseless, Your Honor. And as an example "objectively baseless" means that the infringement allegations are such that no reasonable litigant could reasonably expect success on the merits. That is not the case here. Summary judgment was denied under section 112. Summary judgment was denied under section 101. There was a favorable claim construction, and the Court ultimately, although I think there was some missteps on the way, ultimately said, "You guys got it right. You at least put in enough detail to have a contention that meets the criteria this court wants," and there was no evidence of zero sales that were ever presented at any time, despite the fact that there were requests for it.

Now, I don't -- I don't believe in the blame game. What you do, you do, and you should be responsible for it. You can't blame the other guy for it, but here, our people asked, at the outset of this case, "Tell us what your sales are. Tell us what the use is of these specific products." Not all products. These products. And instead of saying,

Adaptive Deinterlacing or 3:2 Pulldown Detection." Yet, when you look at the record, we said, "Oplus does not contend that any method which performs deinterlacing on the interlacing field subjected to 3:2 pulldown necessarily involves a determination of entropy." Just the opposite of what they're saying.

Have we been perfect? No. Have we been vexatious? I think not, Your Honor, and I would implore the court, because I recognize there is -- there is some -- I want to put this properly -- distaste for the approach of one of the lawyers in our office for which I again apologize, but that conduct, bad as it may be, shouldn't result in a sanction for our client or to all the members of this law firm --

THE COURT: How did I start?

MR. NIRO: Pardon.

THE COURT: How did I start what I said with you?

MR. NIRO: You said that you don't --

THE COURT: I said that I don't give attorneys' fees, and that I don't want to hold against your firm what I regarded as arrogant behavior on the part of the lawyer who appeared before me. That's what I said.

MR. NIRO: I understand, Your Honor. And I'm not going to go into this any further.

We took a look, and I asked the people in the

and they did nothing with it. They couldn't -- they refused to take any discovery that would enable them to know how any of the chips worked.

So you can spend a lot of time going through all the papers that Oplus has filed in this case and the one thing you won't see is any explanation of how the video processing in any Vizio television works because they don't have the faintest idea. They made no pre-filing investigation.

THE COURT: I think I have to agree with that.

MS. PRUETZ: And as far as their infringement contentions and his comment that the infringement contentions don't just rely on "Motion Adaptive Deinterlacing and 3:2 Pulldown," they do say that, but when we pushed them to identify other characteristics, you know, anything else going on in the video processing other than these old prior art technologies, they couldn't do it, and they've never done it. They've never identified any other characteristics. They claim that they don't misrepresent the law and give false testimony, and I won't belabor that issue because our papers show repeatedly that they do just that. They misstate exhibits. They misstate the law. They misstate the fact that section 1927 has been found as a basis of awarding fees against law firms by numerous circuits, including the Federal Circuit.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff,	)	Civil Action No. 1:11-cv-8539
	)	Honorable Robert M. Dow, Jr.
vs.	)	Magistrate Judge Michael T. Mason
	)	**JURY TRIAL DEMANDED**
SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	)	

FIRST AMENDED COMPLAINT

Plaintiff, Oplus Technologies, Ltd. ("Oplus"), complains of defendants Sears Holdings Corporation ("Sears") and Vizio, Inc. ("Vizio") (collectively, "Defendants") as follows:

PARTIES, JURISDICTION AND VENUE

1. This is a claim for patent infringement arising under the patent laws of the United States, including 35 U.S.C. §§ 271 and 281. This Court has exclusive jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

2. Oplus is a foreign corporation organized under the laws of the state of Israel.

3. Oplus owns the full and exclusive right, title and interest in and has standing to sue for infringement of United States Patent No. 6,239,842 entitled "Method of De-Interlacing Video Signals Using a Mixed Mode Spatial and Temporal Approximation Technique," which issued May 29, 2001 (the "'842 Patent"). A true and correct copy of the '842 Patent is attached as Exhibit A.

4. Oplus also owns the full and exclusive right, title and interest in and has standing to sue for infringement of United States Patent No. 7,271,840 entitled “Method for Determining Entropy of a Pixel of a Real Time Streaming Digital Video Image Signal, and Applications Thereof,” which issued September 18, 2007 (the “’840 Patent”). A true and correct copy of the ‘840 Patent is attached as Exhibit B.

5. Sears Holdings Corporation is a Delaware Corporation, with its principal place of business at 3333 Beverly Road, Hoffman Estates, Illinois 60179.

6. Vizio, Inc. is a California corporation, with its principal place of business at 39 Tesla, Irvine, California 92618-4603.

7. Defendants have sold or offered to sell products that infringe the ‘842 and ‘840 Patents within this judicial district, and have advertised the sale of such products in this judicial district.

8. Venue is proper in this district under 28 U.S.C. § 1400(b).

PATENT INFRINGEMENT

9. Vizio has infringed the ‘842 Patent at least by making, using, importing, selling or offering to sell, and/or by contributing to others’ use of, among other products, video products using deinterlacing methods that fall within the scope of at least claim 14 of the ‘842 Patent. An example of such infringing products is the Vizio VP505XVT television, which was sold by Sears and advertised by Vizio as being sold through Sears. Alternatively, Vizio is indirectly infringing the ‘842 Patent because it now knows, and has known since the filing of the original Complaint, that the steps of the claimed method described in claim 14, for example, are performed by users of Vizio products, such as the VP505XVT television. The Vizio products, such as the VP505XVT television, are especially designed and made in a manner such that there are no

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substantial non-infringing uses. A representative claim chart illustrating infringement of claim 14 of the ‘842 Patent by Vizio is attached as Exhibit C.

10. Sears has infringed the ‘842 Patent at least by importing, selling and/or offering to sell such infringing products as the Vizio VP505XVT television. For example, Sears has sold products that infringe claim 14 of the ‘842 Patent including the Vizio VP505XVT television. A representative claim chart illustrating infringement of claim 14 of the ‘842 Patent by Sears is attached as Exhibit C.

11. Vizio has infringed the ‘840 Patent at least by making, using, importing, selling or offering to sell, and/or by contributing to others' use of, among other products, video products using video signal error correction methods that fall within the scope of at least claim 56 of the ‘840 Patent. Examples of such infringing products are the Vizio P50HDTV10A, VM60P, GV46L and JVP50 televisions, which were sold by Sears and advertised by Vizio. Alternatively, Vizio is indirectly infringing the ‘840 Patent because it now knows, and has known since the filing of the original Complaint, that the steps of the claimed method described in claim 56, for example, are performed by users of Vizio products, such as the P50HDTV10A, VM60P and GV46L televisions. The Vizio products, such as the P50HDTV10A, VM60P, GV46L, and JV50P televisions, are especially designed and made in a manner such that there are no substantial non-infringing uses. A representative claim chart illustrating infringement of claim 56 of the ‘840 Patent by Vizio is attached as Exhibit D.

12. Sears has infringed the ‘840 Patent at least by importing, selling and/or offering to sell such infringing video products using video signal error correction methods that fall within the scope of at least claim 56 of the ‘840 Patent. For example, Sears has sold products that infringe claim 56 of the ‘840 Patent including the Vizio JV50P television. A representative claim chart illustrating infringement of claim 56 of the ‘840 Patent by Sears is attached as Exhibit D.

13. Defendants' acts of infringement have injured Oplus, and Oplus is entitled to recover damages adequate to compensate it for the infringement that has occurred, but in no event less than a reasonable royalty.

14. The acts of infringement by Defendants have injured and will continue to injure Oplus, unless and until such infringement is enjoined by this Court.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff, Oplus Technologies, Ltd., respectfully request judgment against Defendants and their subsidiaries and affiliates as follows:

A. An award of damages adequate to compensate Oplus for each of Defendants' acts of infringement, together with prejudgment interest from the date infringement of the '840 and '842 Patents began through the expiration of the respective patents;

B. An injunction permanently prohibiting Defendants and all persons in active concert or participation with them, from further acts of infringement of the '840 and '842 Patents; and

C. Such other and further relief as this Court or a jury may deem proper.

JURY DEMAND

Plaintiff demands a trial by jury on all issues so triable.

Respectfully submitted,

/s/ Raymond P. Niro

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Attorneys for Oplus Technologies, Ltd.

EXHIBIT C

TO

FIRST AMENDED COMPLAINT

Infringement Chart
U.S. Patent No. 6,239,842
Vizio Corp. and Sears Holding Corp.
Product: VP505XVT Televisions with HQV

Claim Element	Evidence
14. A method for de-interlacing an interlaced video format,	At least Vizio's VP505XVT televisions make use of HQV technology to give them an advantage in video quality. From the Press Release accessed on 11-27-2011 at http://www.noydcom.com/press_release/vizio/XVT/VIZIO_XVT_PR_FNL.pdf: **VP505XVT FULL 1080p Plasma with SILICON OPTIX HQV (Hollywood Quality Video) Processing** VIZIO jumps deeper into Full High-Definition 1080p plasma performance with a bang to capture the imagination of even the most discerning consumers with the 50" VIZIO VP505XVT. Plasma TVs are the preferred choice for superior color, higher contrast ratios, longer panel life and fast refresh rates. To ensure smooth, crisp, clean, and more vibrant images, VIZIO integrated the Silicon Optix's REON HQV processing into the VP505XVT. This advanced technology brings out even the finest details with both Standard Definition (SD) and High Definition (HD) sources. Rendered colors are more natural, showing true color tones as they were intended. Moreover, Silicon Optix HQV's advanced noise reduction removes noise and artifacts caused by signal compression from cable and satellite providers. Since the HQV's REON chip can process two full channels of HD or SD channels, this allows users to achieve full resolution with picture-in-picture images. Vizio further points out how this product is being sold through Sears, among other retailers: Available through traditional consumer electronics retailers such as Circuit City and Sears and Club retailers like Costco and Sam's Club, the new VIZIO VP505XVT will ship in July with an estimated selling price of $1699.99. http://www.noydcom.com/press_release/vizio/XVT/VIZIO_XVT_PR_FNL.pdf

Infringement Chart
U.S. Patent No. 6,239,842
Vizio Corp. and Sears Holding Corp.
Product: VP505XVT Televisions with HQV

Hollywood Quality Video (HQV) advertises on their website this model makes use of such technology. From HQV's website's projectors products page assessed on 11-27-2011 at http://www.hqv.com/index.cfm?page=products.displays

Vizio

The Vizio VP505XVT products feature the finest technology available today, Including HQV® Hollywood Quality Video™ processing working with full high definition 1080p resolution, these plasma displays offer great visual experience in high-definition flat panel technology. Whether it's High Definition, Standard Definition, or EDTV, the signals are reproduced with amazing results.

VP505XTV 50" Plasma TV

HQV is a technology suite that performs many video error correction and video enhancement processes, including a pixel-based motion adaptive de-interlacing process. This process is shown on HQV's website's de-interlacing technology page accessed on 1-20-2011 at http://www.hqv.com/index.cfm?page=tech.de-interlacing:

IDT HQV approach (pixel-based motion adaptive)

HQV processing represents the most advanced de-interlacing technique available: a true pixel-based motion-adaptive approach. With HQV processing, motion is identified at the pixel level rather than the frame level. While it is mathematically impossible to avoid discarding pixels in motion during de-interlacing, HQV processing is careful to discard only the pixels that would cause combing artifacts. Everything else is displayed with full resolution.

Pixel-based motion-adaptive de-interlacing avoids artifacts in moving objects and preserves full resolution of non-moving portions of the screen even if neighboring pixels are in motion.

Infringement Chart
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Product: VP505XVT Televisions with HQV

the method comprising the steps of: receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced;	HQV technology includes de-interlacing video, and states that 4 fields are used "to implement a true per-pixel motion-adaptive deinterlacer." http://www.hqv.com/index.cfm?page=tech.de-interlacing
using a current spatial field featuring missing spatial pixels and said spatial pixels with known values, located in said sequence of said pixels,…	HQV's deinterlacing process includes "the two fields being analyzed in the current frame[.]" http://www.hqv.com/index.cfm?page=tech.de-interlacing
and one temporal field featuring temporal pixels with known values, located in said sequence of said fields,…	"In addition to the two fields being analyzed in the current frame, the two previous fields are required in order to determine which pixels are in motion." http://www.hqv.com/index.cfm?page=tech.de-interlacing HQV further brags about this temporal process for de-interlacing on their de-interlacing technology page cited above: HQV Processing continues to analyze at the per-pixel level using four-field analysis even in high-definition.
…for determining values of said missing pixels of said current spatial field;	The Vizio televisions sold by Sears with HQV technology use this data from the temporally related fields (as detailed below) to establish the values of the missing pixels.

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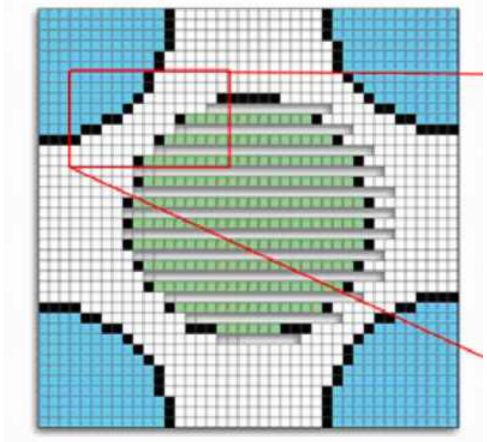
Vizio Corp. and Sears Holding Corp.
Product: VP505XVT Televisions with HQV

evaluating logical operations of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of said temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, \`and\`, \`or\`, and \`xor\`; and	This element requires that the missing pixels are identified through averaging, creating a multitude of various potential values to calculate off of using any applicable logical operation. This allows a great level of flexibility on calculating ideal formulas and values to utilize to de-interlace the video correcting for common errors that will result from a blind application of the temporal field's pixel values to the current field's missing pixels. Vizio televisions using HQV technology utilize HQV's pixel-based motion adaptive de-interlacing technique to try to correct these sorts of common errors as well. HQV notes that its pixel-based motion adaptive process for de-interlacing discards only pixels that would cause artifacts by analyzing movement at the pixel level across temporally related fields to measure the movement. In other words, HQV's processes must take a multitude of potential values to fill in for the missing current pixels and perform logical operations upon them to determine the best fit value in light of the motion present. As stated by Jed Deame, a co-founder and General Manager of Teranex/SiliconOptix: HQV processing represents the most advanced de-interlacing technique available: a true pixel-based motion-adaptive approach. With HQV processing, motion is identified at the pixel level rather than the frame level. While it is mathematically impossible to avoid discarding pixels in motion during de-interlacing, HQV processing is careful to discard only the pixels that would cause combing artifacts. Everything else is displayed with full resolution.

Infringement Chart
U.S. Patent No. 6,239,842
Vizio Corp. and Sears Holding Corp.
Product: VP505XVT Televisions with HQV



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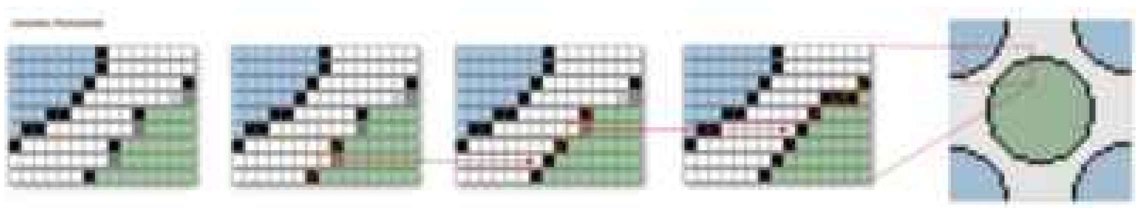
"Second Stage" Diagonal Interpolation To recover some of the detail lost in the areas in motion, HQV processing implements a multi-direction diagonal filter that reconstructs some of the lost data at the edges of moving objects, filtering out any "jaggies." This operation is called "second-stage" diagonal interpolation because it's performed after the deinterlacing, which is the first stage of processing. Since diagonal interpolation is independent of the de-interlacing process, competitors have used similar algorithms with their frame-based de-interlacing approaches.



http://www.digitalsalesgroup.com/directlines/onkyo/newsletters/HQV_processing_for_Reon.pdf

Infringement Chart
U.S. Patent No. 6,239,842
Vizio Corp. and Sears Holding Corp.
Product: VP505XVT Televisions with HQV

deciding upon assignment of said values to said missing spatial pixels according to results of said logical operations.	As shown above, Vizio televisions sold by Sears and using HQV must decide upon assignment of values as dictated by the logical operations shown and discussed above, both through the initial step of selectively employing temporal placement of pixels from prior fields of the image (e.g., where motion is not detected), and through the step of assignment of values based upon, e.g., diagonal interpolation to fill in detail to replace values that might otherwise create feathering or combing artifacts.

EXHIBIT D

TO

FIRST AMENDED COMPLAINT

Infringement Chart
U.S. Patent No. 7,271,840
Vizio Televisions, Includes Televisions Sold by Sears
Product: The Vizio P50HDTV10A, VM60P, GV46L, and JV50P televisions

Claim Element	Evidence
56. A method determining entropy of a pixel of a real time streaming digital video image signal,	 Vizio's P50HDTV10A, VM60P, GV46L, and JV50P televisions use Faroudja/Genesis chips to give the product advantages in video quality. For example, a product listing discusses the use of such Faroudja technology in a 50" Vizio Plasma model at : http://www.hdtvsolutions.com/pdf/P50HDTV10A_SPEC[1].pdf

Infringement Chart
U.S. Patent No. 7,271,840
Vizio Televisions, Includes Televisions Sold by Sears
Product: The Vizio P50HDTV10A, VM60P, GV46L, and JV50P televisions

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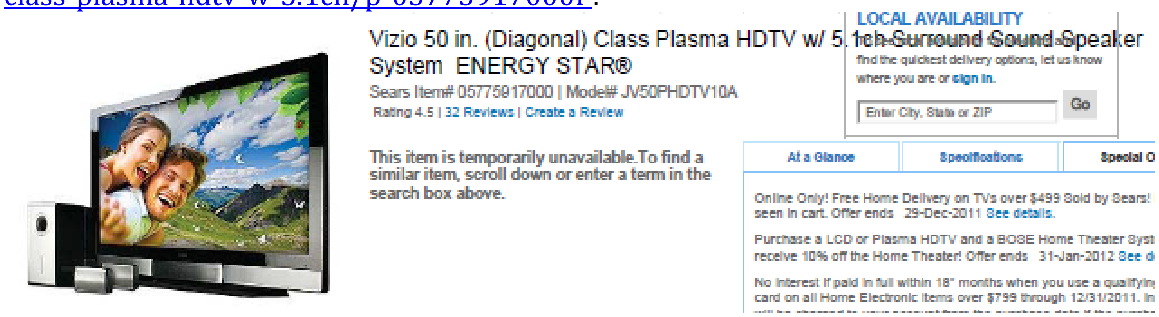
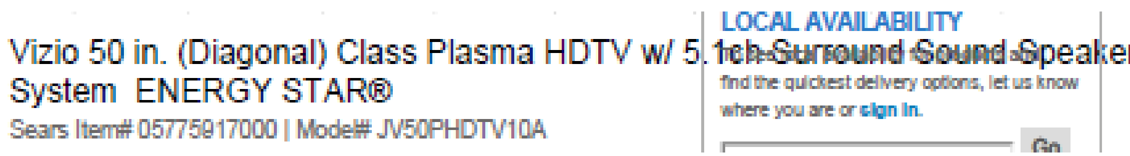
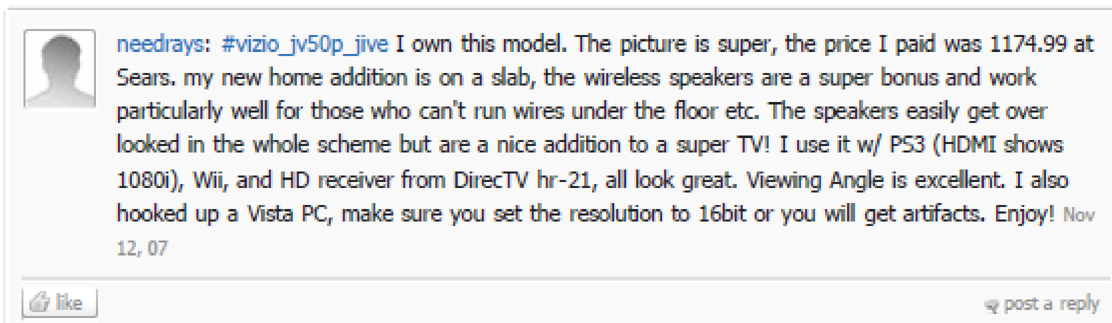
Infringement Chart
U.S. Patent No. 7,271,840
Vizio Televisions, Includes Televisions Sold by Sears
Product: The Vizio P50HDTV10A, VM60P, GV46L, and JV50P televisions

	Likewise, Sears has sold Vizio plasma televisions with this technology, such as the JV50P Television, as evidenced by the following at http://www.sears.com/vizio-50-in-diagonal-class-plasma-hdtv-w-5.1ch/p-05775917000P:   Likewise, the following website at http://plasmatvs.productwiki.com/vizio-jv50p-jive/ provides further support that Sears has sold the JV50 P television model: 

Infringement Chart
U.S. Patent No. 7,271,840
Vizio Televisions, Includes Televisions Sold by Sears
Product: The Vizio P50HDTV10A, VM60P, GV46L, and JV50P televisions

	The processing chips included in these Vizio televisions use (for instance) Genesis' Faroudja DCDi technology's motion adaptive noise reduction process. From a data sheet accessed on 1-19-2011 at http://www.datasheetarchive.com/FLI2300-datasheet.html The FLI2300 Digital Video Format Converter produces the highest quality upconverted video output from a variety of interlaced video inputs including 525i/50 (NTSC), 625i/50 (PAL or SECAM), 480p/60, 720p/60, 1080i/60 (ATSC) and RGB graphics up to SXGA, with a maximum pixel rate of 75 MHz. It uses patented and patent pending motion-adaptive deinterlacing that selects the optimal filtering on a per-pixel basis to produce maximum resolution without introducing motion artifacts. This includes film mode for proper handling of 3:2 and 2:2 pulldown as well as bad edit detection and correction, technologies invented by Faroudja Laboratories. Prior to deinterlacing, the built-in motion-adaptive noise-reducer can be used to improve the signal-to-noise ratio, resulting in further improved deinterlacing. Another proprietary feature is Directional Correlational Deinterlacing (DCDi™). This technology identifies edges at any angle in
for automatically correcting an error produced during real time editing of the real time streaming digital video image input signal,	Steaming digital video signals must be corrected and edited in real time without user intervention to be able to perform as a live streaming device. Therefore, Vizio's Televisions, like all modern consumer digital video signal editors, performs its edits in real time, and any error correction performed must, by nature, be automatic.

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comprising the steps of: receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;	Among other features of the Genesis chipset Vizio utilizes, there is the Motion Adaptive Noise Reduction which works off of a temporal filtering system. The Motion Adaptive Noise Reduction must utilize a temporal filtering system because it must read and recognize movement, which is impossible without considering multiple frames or fields across a pre-determined time interval. The following is from Genesis Microchip's technology page accessed on 1-19-2011 at http://www.gnss.com/technology.phtml • **Motion Adaptive Noise Reduction** Noise on an image is typically eliminated or reduced by filtering. Filtering can be done spatially, (2-D), or temporally, (3-D). Spatial filtering results in a soft image with loss of detail. Temporal filtering does not create loss of detail, but if done incorrectly, does result in smearing or ghosting of moving objects in the image. Genesis uses Motion Adaptive processing to reduce noise without introducing smearing.
assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and	This element requires that the video error correction method select an area (the entirety or a subset) of a field, then also establish identical areas in the field before and the field after. This selection creates a temporal field for analysis. The Motion Adaptive Noise Reduction of chipsets utilized by the Vizio Televisions must consider a temporal field to detect motion with any accuracy, which is further indicated by the fact that the technology is based on temporal noise reduction filtering. Only through considering a temporally related portion of time may motion by properly detected to ensure that error correction does not affect motion to create the smearing or ghosting that Genesis warns of above.

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determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels, said determining comprising the steps of:	This element requires the pixels of the temporal fields to be compared to detect pixels affected by noise, which is a form of video error that is based on the entropy of the data. For the Genesis chipset utilized by Vizio's televisions to perform temporal comparisons, especially for the motion detection, it must measure the value of each pixel, then measure the value of other pixels in the same spatial neighborhood across multiple temporally associated frames. Comparing these values is how noise can be established to be affecting any pixels within these temporally associated frames.
calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;	This element is the first step of the above comprising element, where the selected area of the fields are compared, detecting the changes that occur between each and to create a weighted change between each. When the Genesis chipset utilized by Vizio's televisions compares these temporally related frames, the values of the neighborhood of pixels on each much be measured, then compared to establish the change over time among the temporally related fields.

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Infringement Chart
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calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field;	This element requires a value to be developed for what a pixel determined to be affected by noise should be in the current field, based on the weighted change established. Once the Genesis chipset utilized by Vizio's television performs its measurements and comparisons, calculation must be made to determine what the proper value of a pixel affected by noise should be.
adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and	This element requires it to be established which pixels in each of the temporally related fields are affected by noise or other errors, to establish the level of entropy for that pixel. After all, noise in a previous or next field should not be considered in the calculation for the proper value of a pixel in the current field. For the Genesis chipset utilized by the Vizio televisions calculations to be accurate for what the error corrected value should be, pixels also affected by noise should not be used. In addition, the chipset further relies on the measurement of movement in pixels between the frames to avoid creating ghosting by use of moving elements in the frames.

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calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said pixel entropy counters of said pixels, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.	This element takes the conclusions from the above steps to establish the new, proper, value for any pixels in the current field affect by noise. The Genesis chipset utilized by Vizio's televisions then uses the correct, applicable , pixels in the neighboring fields to determine the new value for the pixels in the current field that must be adjusted and then actually adjust to said value. Applying the result of the calculations to replace the pixels affected by error is also performed. Also of note, the Genesis chipset utilized by Vizio's televisions does not utilize only the Motion Adaptive Noise Reduction for temporal filtering. The TrueLife Enhancement and Cross Color Suppression also are based on temporal filtering, because they, like the above, require the measurement of movement between frames.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

OPLUS TECHNOLOGIES, LTD

Plaintiff,

v.

SEARS HOLDINGS CORPORATION and VIZIO, INC.

Defendants.

Civil Action No. 1:11-cv-8539

Honorable Robert M. Dow, Jr.

Magistrate Judge Michael T. Mason

Jury Trial Demanded

DEFENDANT VIZIO, INC.'S MOTION TO SEVER AND TRANSFER CLAIMS AGAINST VIZIO AND STAY CLAIMS AGAINST SEARS

760384.1

Defendant VIZIO, Inc. ("VIZIO") moves to sever the patent infringement claims against it and transfer those severed claims to the United States District Court for the Central District of California pursuant to the provisions of Fed. R. Civ. P. 21 and 28 U.S.C. § 1404(a). VIZIO further moves to stay the case against defendant Sears Holdings Corporation ("Sears") pending the outcome of the case against VIZIO.

This Motion is brought on the following grounds:

1) Sears is a peripheral customer defendant sued solely on the ground that it purchased allegedly infringing televisions from VIZIO. Therefore, it is a peripheral defendant and this Court should stay the action against Sears pending the outcome of the action against VIZIO.

2) The case against VIZIO should be transferred to the Central District of California because: (1) plaintiff Oplus is an Israeli company with no ties to this District; (2) VIZIO is a California corporation with no ties to this District; (3) VIZIO is located in the Central District of California; (4) the events material to the allegations of infringement took place in the Central District of California; (5) litigating this lawsuit in the Central District of California would be substantially more convenient for the parties and the witnesses, with better access to sources of proof, as VIZIO's witnesses and documents are located in the Central District of California; (6) the three key third-party companies and their witnesses and documents are located in California; and (7) the Central District of California has a greater interest in resolving this dispute.

VIZIO's Motion is based upon the Notice of Motion, this Motion, the accompanying Memorandum of Points and Authorities, the declarations of Adrian M. Pruetz, Kenneth Lowe, and Rob Brinkman, and upon such other and further evidence and argument as may be presented at or before the hearing on this Motion.

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DATED: March 20, 2012

/s/ Adrian M. Pruetz ______

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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

OPLUS TECHNOLOGIES, LTD.,	)	
	)	
Plaintiff,	)	
	)	
v.	)	Case No. 11-cv-8539
	)	
SEARS HOLDING CORPORATION and VIZIO, INC.,	)	Judge Robert M. Dow, Jr.
	)	
Defendants.	)	

MEMORANDUM OPINION AND ORDER

Plaintiff Oplus Technologies, Ltd. ("Oplus") filed suit against Defendants Sears Holding Corporation ("Sears") and Vizio, Inc., alleging patent infringement. Vizio moves [36] to sever the patent infringement claims against it from the claims alleged against Sears, transfer the claims against Vizio to the U.S. District Court for the Central District of California, and stay the case involving the remaining claims against Sears, pending the outcome of the Vizio case. For the reasons set forth below, the Court grants Vizio's motion to sever and transfer claims against Vizio and stay claims against Sears [36] in its entirety.

I. Background

Plaintiff Oplus is a foreign corporation organized under the laws of Israel. Defendant Vizio, Inc. is a California corporation with its principal place of business in Irvine, California, while Defendant Sears is a Delaware Corporation with its principal place of business in Hoffman Estates, Illinois. This dispute involves two patents owned by Oplus: U.S. Patent No. 6,239,842, entitled "Method of De-Interlacing Video Signals Using a Mixed Mode Spatial and Temporal Approximation Technique" (the '842 Patent), and U.S. Patent No. 7,271,840, entitled "Method for Determining Entropy of a Pixel of a Real Time Streaming Digital Video Image Signal, and

Applications Thereof" (the '840 Patent). The '842 Patent was issued on May 29, 2001, while the '840 Patent was issued on September 18, 2007. Yosef Segman, the inventor of these patents, is a resident of Israel. Oplus alleges that Defendants have sold or offered to sell products that infringe these patents within the Northern District of Illinois and further alleges venue is proper pursuant to 28 U.S.C. § 1400(b), which provides: "Any civil action for patent infringement may be brought in the judicial district where the defendant resides, or where the defendant has committed acts of infringement and has a regular and established place of business."

In its amended complaint, Oplus claims that Vizio infringed its patents by making, using, importing, selling or offering to sell, and/or by contributing to others' use of audio and video products which use methods that fall within the scope of its patents. Oplus also claims that Sears infringed its patents by importing, selling, and/or offering to sell infringing Vizio products. According to Vizio, Sears is a former Vizio customer, but has not been supplied with Vizio televisions since January 2010, approximately two years prior to the filing of Plaintiff's lawsuit. Vizio also maintains that its sales of the alleged infringing products to Sears constituted a very minor portion of Vizio's business during the relevant period. According to Vizio's declarations (and not rebutted by Plaintiff with evidence), Sears had no involvement in the design, development, manufacture or any other aspects of the accused Vizio products. Furthermore, Vizio accepted Sears's tender of defense and request for indemnity, and Sears is represented in this action by Vizio's counsel.

Vizio moves to sever the infringement claims against it from the claims against Sears, arguing that Sears is merely a "peripheral defendant" and that the claims alleged by Oplus against Sears were brought solely to establish venue in the Northern District of Illinois. Vizio

further moves to transfer the claims against it to the Central District of California, where Vizio is located, and to stay the claims remaining in the Northern District of Illinois against Sears pending the resolution of the transferred claims against Vizio. Oplus opposes Vizio's requests.

II. Analysis

A. Motion to Sever and Stay

Federal Rule of Civil Procedure 21(a)(2) permits defendants to be joined in a single action if: "(A) any right to relief is asserted against them jointly, severally, or in the alternative with respect to or arising out of the same transaction, occurrence, or series of transactions or occurrences; and (B) any question of law or fact common to all defendants will arise in the action." Beyond these two requirements, consideration is given as to whether joinder would result in prejudice against any parties or otherwise cause delay. *First Time Videos, LLC v. Does 1-500*, 276 F.R.D. 241, 252, (N.D. Ill. 2011). If parties have been improperly joined as defendants, the court may sever the claims pursuant to Rule 21. Rule 21 provides, "On motion or on its own, the court may at any time, on just terms, add or drop a party. The court may also sever any claim against a party." The district court has "broad discretion whether to sever a claim under Rule 21." *Rice v. Sunrise Express, Inc.*, 209 F.3d 1008, 1016 (7th Cir. 2000). Claims may be severed, and the severance may create two separate proceedings, provided that the claims are "discrete and separate." *Gaffney v. Riverboat Services of Indiana, Inc.*, 451 F.3d 424, 442 (7th Cir. 2006) (quoting *Rice*, 209 F.3d at 1016).

As in deciding whether to sever claims, a court also has broad discretion in deciding whether to stay proceedings. "[T]he power to stay proceedings is incidental to the power inherent in every court to control the disposition of the causes on its docket with economy of

time and effort for itself, for counsel, and for litigants." See, *e.g., Tex. Independent Producers & Royalty Owners Ass'n v. EPA*, 410 F.3d 964, 980 (7th Cir. 2004) (quoting *Landis v. N. Am. Co.*, 299 U.S. 248, 254, (1936)). When ruling on a motion to stay proceedings, courts consider the following: "(1) whether a stay will unduly prejudice or tactically disadvantage the non-moving party, (2) whether a stay will simplify the issues in question and streamline the trial, and (3) whether a stay will reduce the burden of litigation on the parties and on the court." *Tap Pharmaceutical Products, Inc. v. Atrix Laboratories, Inc.*, 2004 WL 422697, at *1 (N.D. Ill. March 3, 2004).

Vizio argues that the claims alleged against it should be severed from the claims alleged against Sears because the Sears claims are unnecessary to resolve the issue of infringement. Vizio asserts that Sears "has nothing substantive to offer this infringement action," but was named as a party by Oplus simply to establish venue in the Northern District of Illinois. "It is not uncommon for courts to sever claims by patent holders against peripheral defendants in order to transfer the litigation to a more appropriate forum." *Calmedica, LLC v. Novoste Corp.*, 2004 WL 413296, at *1 (N.D. Ill., Jan. 30, 2004) (citing *Safe Bed Technologies Co. v. KCI USA, Inc.*, 2002 WL 1769991 (N.D. Ill. July 31, 2002); *Ambrose v. Steelcase, Inc.*, 2002 WL 1447871 (N.D. Ill. July 3, 2002)). Defendants are "peripheral" when they lack relevant and material information and were selected to procure venue. *Spread Spectrum Screening, LLC v. Eastman Kodak Co.*, 2010 WL 3516106, at *2 (N.D. Ill. Sept. 1, 2010). Courts in this district repeatedly have held that "joinder of 'peripheral' defendants to prevent the transfer of an action to a more appropriate venue is improper." *Id.* As noted in *Spread Spectrum*, the remedy is to sever and stay the claims against the peripheral defendant pursuant to Fed. R. Civ. P. § 21:

> Kodak's Customers will add nothing to plaintiff's infringement action against Kodak, and it is obvious that plaintiff has attempted to establish proper venue in the Northern District of Illinois by adding Kodak's customers to the instant action * * * * because Kodak's customers merely use a Kodak product, they have nothing substantive to offer during plaintiff's action against Kodak and likely do not even understand how the product software actually works and will not be helpful to determine whether Kodak's Staccato® product infringes the '623 patent. Consequently, they are merely peripheral in the litigation between plaintiff and Kodak. For these reasons, Kodak's motion to sever plaintiff's claims against Kodak from plaintiff's claims against Kodak's Customers is granted.

Id. at 3.

Sears appears to be such a peripheral defendant. According to Vizio and not disputed by Plaintiff, Vizio's sales of the accused televisions to Sears constituted a very minor portion of Vizio's business during the relevant period. Furthermore, Vizio attests (and Plaintiff does not present evidence to the contrary) that Sears had no involvement in the design, development, manufacture, or any other technical aspects of the accused Vizio products. Thus, it follows that Sears is not likely to have information bearing on Oplus's infringement claims or Vizio's defenses. Moreover, Sears is one customer of many and has not sold Vizio televisions since January 2010. When a plaintiff chooses only one reseller of the accused product out of many, the "inference here is irresistible that the principal reason [the customer defendant] has been sued is to establish venue in the Northern District of Illinois." *Ambrose v. Steelcase, Inc.,* 2002 WL (N.D. Ill. July 3, 2002); see also *Burroughs Corp. v. Newark Elecs. Corp*., 317 F. Supp. 191, 193 (N.D. Ill. 1970) (granting motion to sever and transfer on the ground that customer defendant was not the party in interest).

Oplus opposes severance, arguing that "Sears * * * is located in this district and has as much involvement in the 'design, development and manufacture' of the accused televisions as does Vizio." Notably, Oplus does not cite any evidence to support this assertion. Oplus does not

deny that Sears has no relevant information regarding the accused products. Specifically, Oplus does not dispute that: (1) Sears has only been sued in this action based on its sale of alleged infringing VIZIO televisions; (2) Sears has not sold Vizio televisions for over two years; (3) Sears's liability in this suit rests on Vizio's liability; and (4) Vizio is indemnifying Sears for Oplus's claims against it in this action. Moreover, even if Vizio's televisions are manufactured overseas (as many products sold by American companies are), Oplus has not put forth any evidence to dispute Vizio's assertions that it conceives and develops its products and oversees their implementation by third party designers and manufacturers.

The naming of an insignificant party as a defendant in an action simply to establish venue in the chosen district is impermissible forum shopping. Here, the obvious reason Oplus joined Sears in this action was to establish venue in the Northern District of Illinois. See *Spread Spectrum*, 2010 WL 3516106, at *3. Because Sears is merely peripheral to this lawsuit, case law counsels that the claims against Sears should be severed from the claims against Vizio. See *Ambrose*, 2002 WL 1447871, at 6-7; *Thermapure, Inc. v. Temp-Air, Inc.*, 2010 WL 5419090 (N.D. Ill. Dec. 22, 2010).

Further, while the action against Vizio is pending, the Court will stay the action against Sears. See, *e.g.*, *Spread Spectrum*, 2010 WL 3516106, at *6; *Thermapure, Inc., Inc.*, 2010 WL 5419090 at *9-10. Oplus's claims against Sears depend on Vizio's liability. As the court explained in *Card Activation Technologies v. Pier 1 Imports., Inc.*, granting a motion to stay in these circumstances is appropriate because "litigation against * * * the manufacturer of infringing goods takes precedence over a suit by the patent owner against customers of the manufacturer." 2009 WL 2956926, at *2 (N.D. Ill. Sept. 14, 2009). A stay in this instance benefits judicial economy and serves "the just, speedy and inexpensive disposition of this

litigation." *Thermapure, Inc., Inc.*, 2010 WL 5419090 at *10. This is particularly true given Vizio's promise to defend and indemnify Sears in this action. See *Emhart Indus., Inc. v. Universal Instruments Corp.*, 1988 WL 121538, at *1 (N.D. Ill. Nov. 3, 1988) (noting that indemnification further ensured no prejudice to customers, and that severance and staying of case precluded multiplicity of litigation). Vizio is the real party in interest who must defend this infringement suit. All of the substantive issues regarding patent infringement as they relate to the claims against Sears first will be resolved in the action against Vizio—indeed, the resolution of the Vizio action could potentially eliminate the claims against Sears—and this would significantly simplify the issues in the Sears case and substantially reduce the burden of litigation on the parties, as well as the Court. Thus, the claims against Sears will be severed and stayed.

B. Motion to Transfer

A district court, "[f]or the convenience of parties and witnesses, in the interest of justice, * * * may transfer any civil action to any other district court where" jurisdiction and venue would have been proper at the time the suit was initiated. 28 U.S.C. § 1404(a); see *Hoffman v. Blaski*, 363 U.S. 335, 344 (1960). The moving party has the burden of establishing "that the transferee forum is clearly more convenient," based on the particular facts of the case. *Coffey v. Van Dorn Iron Works*, 796 F.2d 217, 219-20 (7th Cir. 1986). The district court has the authority to "make whatever factual findings are necessary * * * for determining where venue properly lies." *In re LimitNone, LLC*, 551 F.3d 572, 577 (7th Cir. 2008).

In evaluating § 1404(a) motions, the Court considers: (1) the plaintiff's choice of forum, (2) the convenience of the parties, (3) the convenience of the witnesses, (4) the interests of justice, and (5) the location of the material events giving rise to the case. See *Roberts & Schaefer Co. v. Merit Contracting, Inc.*, 99 F.3d 248, 254 (7th Cir. 1996) (listing the first four

statutory factors); see also *Continental Cas. Co. v. Staffing Concepts, Inc.*, No. 06 C 5473, 2009 WL 3055374, *2-3 (N.D. Ill. Sept. 18, 2009) (elaborating on sub-factors). The Seventh Circuit teaches that the specified statutory factors "are best viewed as placeholders for a broader set of considerations, the contours of which turn upon the particular facts of each case." *Coffey*, 796 F.2d at 219 n.3; see also *Cote v. Wadel*, 796 F.2d 981, 985 (7th Cir. 1986) (explaining that the broad discretion accorded the trial court is a product of the "in the interest of justice" language). In cases alleging patent infringement, "the location of the infringer's principal place of business is often the critical and controlling consideration because such suits often focus on the activities of the alleged infringer, its employees, and its documents, rather than upon those of the plaintiff." *Cooper Bauck Corp. v. Dolby Laboratories, Inc.*, 2006 WL 1735282, at * 5 (N.D. Ill. June 19, 2006) (internal quotations omitted).

The first factor, plaintiff's choice of forum, typically is accorded significant weight, *In re Nat'l Presto Indus., Inc.*, 347 F.3d 662, 664 (7th Cir. 2003), unless none of the conduct occurred in that forum, *Chicago, Rock Island & Pac. R.R. Co. v. Igoe*, 220 F.2d 299, 304 (7th Cir. 1955). Regarding the second factor, convenience of the parties, courts consider the residences and resources of the parties—in essence, their "abilit[y] to bear the expense of trial in a particular forum." *Von Holdt v. Husky Injection Molding Sys., Ltd.*, 887 F. Supp. 185, 188 (N.D. Ill. 1995). Examination of the third factor, convenience of the witnesses, emphasizes "the nature and quality of the witnesses' testimony." *Gueorguiev v. Max Rave, LLC*, 526 F. Supp. 2d 853, 858 (N.D. Ill. 2007).

The fourth factor, interests of justice, captures several considerations, including:

> the relative ease of access to sources of proofs; availability of compulsory process for attendance of unwilling, and the cost of obtaining attendance of willing witnesses; the possibility of a view of the premises; and the state of the court

> calendar both in the District where the case is pending, and in the District to which it is sought to have the case transferred.

Igoe, 220 F.2d at 303; see also *Nat'l Presto Indus.*, 347 F.3d at 664 (discussing the "subpoena range" of the district court). Courts also consider their familiarity with the applicable law and "the desirability of resolving controversies in their locale." *Rabbit Tanaka Corp. USA v. Paradise Shops, Inc.*, 598 F. Supp. 2d 836, 841 (N.D. Ill. 2009). And, as previously discussed, the fifth factor, location of material events, becomes comparably more important when it differs from the first factor, plaintiff's choice of forum. *Amorose v. C.H. Robinson Worldwide, Inc.*, 521 F. Supp. 2d 731, 735 (N.D. Ill. 2007) (citing *Igoe*, 220 F.2d at 304).

The parties agree that venue is proper for all parties in both the transferor and transferee districts, so only the convenience and justice factors require consideration. As noted above, weight typically is given to the plaintiff's initial choice of forum, particularly when it is the plaintiff's home forum. However, when the choice of forum lacks a significant connection to the underlying claims, less weight is afforded to the plaintiff's choice. *Symons Corp. v. Southern Forming and Supply, Inc.*, 954 F.Supp. 184, 186 (N.D. Ill. 1997). Here, the sales of the accused products occurred in this district, as well as many other districts, and "[s]ales alone are insufficient to establish a substantial connection to the forum if the defendant's goods are sold in many states." *Anchor Wall Sys., Inc. v. R & D Concrete Products, Inc.*, 55 F.Supp. 2d 871, 874 (N.D. Ill. 1999). Furthermore, Oplus is an Israeli company with no discernable ties to this district.[1] The situs of material events clearly is the Central District of California, where Vizio is

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[1] The location of Oplus's counsel is irrelevant. *In re Zimmer Holdings, Inc.*, 609 F.3d 1378, 1381 (Fed. Cir. 2010); *Heil Co. v. Curotto Can Co.*, 2004 WL 725737, at * (N.D. Ill. Mar. 30, 2004) (noting that the convenience and location of counsel have never been accorded weight in a transfer analysis).

headquartered and operates its principal place of business. Therefore, Oplus's choice of the Northern District of Illinois is afforded little weight in this analysis.

Many of the probable witnesses in this action—who have information about the accused products, their marketing, and sales—are located in California. Vizio represents (and Oplus does not dispute) that Vizio's Vice President of Engineering and co-founder Kenneth Lowe has the most information regarding the development of Vizio's products. Mr. Lowe works and resides in the Central District of California. Rob Brinkman, another Vizio witness, also resides in the Central District. Given that the alleged infringer's witnesses and potentially relevant documents are in California, and that Oplus has no discernable ties to Illinois, the convenience of the parties' factor weighs in favor of transferring the action to California. *Cooper Bauck*, 2006 WL 1735282, at * 5.

In determining the convenience to the witnesses, the court considers "the nature and quality of the witnesses' testimony with respect to the issues of the case." *Schwarz v. Nat'l Van Lines, Inc.*, 317 F.Supp.2d 829, 836 (N.D. Ill. 2004). The convenience of non-party witnesses is more significant to the analysis, since party witnesses are typically required to appear voluntarily. *Amorose v. C.H. Robinson Worldwide, Inc.*, 521 F.Supp.2d 731, 735 (N.D. Ill. 2007). Oplus has not identified *any* third-party witnesses, let alone any in Illinois. The Court presumes that Yosef Segman, the inventor of the patents at issue, will be a witness, but he is a resident of Israel with no discernable ties to Illinois and therefore Illinois is no more convenient for him than California. On the other hand, the chipsets identified by Oplus as infringing are created and supplied by three companies—Genesis Microchip Inc., Integrated Device Technology, and Qualcomm Incorporated—that are headquartered in California. Vizio attests (and Plaintiff does not dispute) that the representatives of these companies who could be called

Case: 14-1297 Document: 41-1 Page: 224 Filed: 11/13/2014

to testify are located in California. Given that all of the witnesses identified to date reside in California (and that the only discernable witness on Plaintiff's side resides in Israel), this factor heavily favors Vizio.

With respect to the access to sources of proof, in a patent infringement case such as this, "practicality and convenience are best served when [the case] is prosecuted where the alleged acts of infringement occurred and the defendant has a regular and established place of business so as to facilitate the production and investigation of books, records and other data necessary to the discovery and trial techniques employed in the patent filed." *Anchor Wall Sys., Inc. v. R & D Concrete Prods., Inc.*, 55 F. Supp. 2d 871, 875 (N.D. Ill. 1999); see also *Rudd v. Lux Prods. Corp.*, 2011 WL 148052, at *3 (N.D. Ill. Jan. 12, 2011) ("In patent infringement cases, the bulk of the relevant evidence usually comes from the accused infringer. Consequently, the place where the defendant's documents are kept weighs in favor of transfer to that location.") (quoting *In re Genentech, Inc.*, 566 F.3d 1338, 1343-45 (Fed. Cir. 2009)). As set forth above, the record to date reflects that the primary sources of proof will be the witnesses and documents at Vizio, Genesis, IDT, and Qualcomm. Vizio contends (and Oplus does not dispute) that all of the evidence related to these companies and their witnesses is located in the Central District of California or in other California districts. Although it is likely that most, if not all, of these documents will be produced electronically, this factor still weighs in favor of Vizio over Oplus. See *Leuders v. 3M Co.*, No. 08–CV–2457, 2008 WL 2705444, at *3 (N.D. Ill. July 9, 2008).

Section 1404(a) also requires courts to consider whether the transfer is in the "interest of justice." Factors to consider include time to trial, relative familiarity with the applicable law, desirability of resolving disputes in their location, the relationship of the community to the controversy, and the possibility of consolidation. *Research Automation, Inc. v. Schrader-*

Bridgeport Int'l, Inc., 626 F.3d 973, 978 (7th Cir. 2010); *Spread Spectrum*, 2010 WL 3516106 at *5-6; *Thermapure, Inc., Inc.*, 2010 WL 5419090 at *8-9. Because this case involves federal patent law, the familiarity factor does not apply, as all federal courts are presumed familiar with patent law. *Rudd*, 2011 WL 148052 at *7.

In terms of time to trial, according to the evidence presented by Vizio and not disputed by Oplus, on average, cases in the Central District of California get to trial five months faster than those in the Northern District of Illinois. According to the Annual Report of the Director of the Administrative Office of the United States Courts for 2011, for the twelve-month period ending March 31, 2011, the Northern District of Illinois handled 7,168 cases, with 134 of those cases going to trial after a median time interval of 24.8 months. Over this same time period, the Central District of California handled 10,716 cases, with 149 cases going to trial after a median time interval of 19.9 months.

Furthermore, there is a “local interest in having localized controversies decided at home.” *Gulf Oil Corp. v. Gilbert*, 330 U.S. 501, 509 (1947); *U.S.O. Corp. v. Mizuho Holding Co.*, 547 F.3d 749, 755 (7th Cir. 2008). Because Vizio is headquartered in the Central District of California and maintains its business operations there, and Oplus does not have a connection to either district, the citizens of the Central District of California have a stronger interest in this action against Vizio than the citizens of the Northern District of Illinois. See *Spread Spectrum*, 2010 WL 3516106 at *6. “[Vizio’s] headquarters are in the [Central] District of [California], its employees are in that district, and that district accordingly is where the impact of the adjudication of [Oplus’s] claims would be felt.” *Thermapure, Inc., Inc.*, 2010 WL 5419090 at *9. Finally, it does not appear likely that the claims against Vizio would be consolidated with Oplus’s three other pending patent infringement actions in this district because the defendants in

those cases are unrelated to Vizio and different products are accused of infringement. The only potential similarity is that all defendants are accused of infringing the same Oplus patents. “Courts in this district, however, have consistently held that Rule 20(a)’s requirement for a common transaction or occurrence is not satisfied where multiple defendants are merely alleged to have infringed the same patent or trademark.” *Thermapure, Inc., Inc.*, 2010 WL 5419090 at *4. In suing each defendant separately, Oplus and its counsel (who also represented *ThermaPure*) implicitly recognized that these defendants, with their different accused products, likely could not be consolidated in the same action. Based this factor, as well as all of the factors discussed above, California clearly is the more convenient forum for this lawsuit.

III. Conclusion

For these reasons, Vizio’s motion to sever and transfer claims against Vizio and stay claims against Sears [36] is granted in its entirety. The claims that Oplus has alleged against Sears are stayed pending the outcome of Oplus’s action against Vizio. The Clerk is directed to transfer the claims asserted by Oplus against Vizio to the United States District Court for the Central District of California.

Dated: June 15, 2012

Robert M. Dow, Jr.
United States District Judge

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
219 SOUTH DEARBORN STREET
CHICAGO, ILLINOIS 60604

Thomas G. Bruton
CLERK

(312) 435-5691

June 29, 2012

Ms. Terry Nafisi, Clerk
United States District Court
United States Courthouse
312 North Spring Street, Room G-8 MNT
Los Angeles, CA 90012-4701

RE: **Oplus Technologies, Ltd. vs. Vizio, Inc. (Only)**
Case No: **11 C 8539**

Dear Clerk:

Pursuant to the order entered by Judge Robert M. Dow, Jr. on June 15, 2012, the above record

■ was electronically transmitted to USDC for the Central District of of California.

Sincerely yours,
Thomas G. Bruton, Clerk

By: /s/
Deputy Clerk

tlm

cc

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IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (E) *Assigned to the Honorable Mariana R. Pfaelzer* **PLAINTIFF OPLUS TECHNOLOGIES, LTD.'S OPENING CLAIM CONSTRUCTION BRIEF** **JURY TRIAL DEMANDED**

the claim language, which refers to "adjusting a value of a pixel entropy counter…and calculating a value of entropy…from said values of said pixel entropy counters of said pixels…" (Ex. 1, Col. 25:60-26:1).

Nowhere does the specification or claims state that the counter has an initial value of 0 or that it is increased by 1 if certain criteria are met, as Vizio proposes. In fact, Vizio's proposal would ***require*** that any counter start at 0 and be increased by 1, when a counter could conceivably start at any number and increase or decrease by any amount, provided the counter is still tracking the value of entropy in some manner. (For example, a counter could start at 1000, and count down by 4).

Further, under Oplus' construction, a "counter" is proposed to be a device (such as a circuit or a programmable processor) whereas Vizio argues that it is merely a variable. Again, Vizio's proposed construction is inconsistent with the examples of hardware and other structures identified in the specification of the '840 patent (Ex. 1, Col. 7:49-67), and is not only too limiting, but also without any intrinsic support. Thus, for the above reasons, Oplus requests that the Court adopt its proposed construction.

V. CONCLUSION

For the reasons set forth above, Oplus requests that the court adopt its proposed claim constructions in full.

Respectfully submitted,

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IN THE UNITED STATES DISTRICT COURT
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WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (E) *Assigned to the Honorable Mariana R. Pfaelzer* **PLAINTIFF'S RESPONSE TO VIZIO'S OPENING CLAIM CONSTRUCTION BRIEF** **JURY TRIAL DEMANDED**

neighborhood parameters, and VIRT is the virtual pixel inter-local neighbhorhood parameter. The counters tracking each of these parameters is described as P1-entropy counter, P2-entropy counter, and the like. There is absolutely no support in the specification that this entropy counter must be a variable. Moreover, even if support did exist, it would run afoul of the same rule – that specific examples and embodiments should not be used to limit the claim terms. Oplus' proposed construction, by contrast, encompasses variables, software, or any other way that the values of pixel local neighborhood parameters can be tracked – the purpose of the pixel entropy counter.

For these reasons, as well as those set forth in Oplus' opening brief, Oplus requests that the Court adopt its proposed construction for "counter."

III. CONCLUSION

For the reasons set forth above, as well as those set forth in Oplus' opening brief, Oplus requests that the Court adopt its proposed constructions in full.

Respectfully submitted,

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION; VIZIO, INC., Defendants.	CASE NO.: CV12- 5707 MRP (Ex) Hon. Judge Mariana R. Pfaelzer **DEFENDANT VIZIO, INC.'S NOTICE OF MOTION AND MOTION FOR SUMMARY JUDGMENT OF INVALIDITY OF U.S. PATENTS NOS. 6,239,842 AND 7,271,840 UNDER 35 U.S.C. §§ 101 AND 112** DATE: February 4, 2013 TIME: 11:00 a.m. PLACE: Courtroom 12

NOTICE OF MOTION AND MOTION FOR SUMMARY JUDGMENT

PLEASE TAKE NOTICE that at 11:00 a.m. on February 4, 2013, or as soon thereafter as counsel may be heard, Defendant VIZIO, Inc. ("VIZIO") will, and hereby does, move this Court, the Honorable Mariana R. Pfaelzer presiding, for Summary Judgment of Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 under 35 U.S.C. §§ 101 and 112.

This motion is based upon this Notice of Motion and Motion, the accompanying Memorandum of Points and Authorities and appendices thereto, Statement of Uncontroverted Facts and Conclusions of Law, Declarations of Charles C. Koole and Dr. Sheila S. Hemami in support of this Motion and exhibits thereto, all pleadings and papers on file in this action, and upon such other matters as may be presented to the Court at the time of the hearing.

In accordance with the Court's standing order and Civil Local Rules, VIZIO counsel certifies that they met and conferred with Oplus Technologies, Ltd.'s ("Oplus") counsel prior to filing this motion. On November 16, 2012, VIZIO counsel met and conferred telephonically with Oplus counsel to discuss the grounds for this Motion. Declaration of Charles C. Koole, ¶12. On the same day, after a request from Oplus counsel for further elaboration, VIZIO counsel sent an email further directing Oplus counsel to VIZIO's Invalidity Contentions, which detail the invalidity of the asserted patent claims under 35 U.S.C. §§ 101 and 112, and provided case authority. *Id.* at ¶13. After a further request from Oplus counsel for more information, on January 2, 2013, VIZIO counsel provided Oplus counsel with a an advance copy of the brief supporting this Motion prior to filing it. *Id.* at ¶14.

Dated: January 7, 2013

Respectfully submitted,

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION; VIZIO, INC., Defendants.	CASE NO.: CV12- 5707 MRP (Ex) Hon. Judge Mariana R. Pfaelzer **DECLARATION OF DR. SHEILA S. HEMAMI IN SUPPORT OF DEFENDANT VIZIO, INC.'S MOTION FOR SUMMARY JUDGMENT OF INVALIDITY UNDER 35 U.S.C. §§ 101 AND 112** DATE: February 4, 2013 TIME: 11:00 a.m. PLACE: Courtroom 12

has a value which is less than 7, and false otherwise. Logical operations can be combined with the "or" and "and" operations. In order for a statement involving "and" to be true, both components must be true. For example, the expression "x < 7 and y < 14" evaluates as true only if the variable x is less than 7 and the variable y is less than 14; otherwise, it evaluates as false. In order for a statement involving "or" to be true, at least one of the two components must be true. The expression "x < 7 or y < 14" evaluates as true when either x < 7, or when y < 14, or when both logical operations are true.

23. The logical operations of the '842 patent are given by the following mathematical statements, taken from FIG. 5/2 step 10b:

(i) Sigma<=(K0+Min-Sigma), where $--C_0$ <=K0<C_0, or
(ii) Min-Sigma >=(W-K1), where $--C_1$ <=K1<C_1, or
(iii) abs (m_T -x_1)<A1, or (iv) abs (m_T -x_2)<A2, or
(v) abs (m_T -x_3)<A3, or (vi) abs (m_T -x_4)<A4, or
(vii) abs (m_T -x_5)<A5, or (viii) abs (m_T -x_6)<A6, or
(ix) m_T <=(B+K2), where $--C_2$ <=K2 <C_2, or
(x) [(Previous-Result)-n_T <=A6] and [m_T >=W-A7],

24. Statement (i) uses the term "Sigma" which is used to represent the standard deviation between the average of neighbor temporal pixels and the minimum-related average of current spatial pixels. FIG. 5/2, Step 9 of the '842 Patent. "Neighbor temporal pixels" refers to pixels with the same row and column coordinates of the missing pixel but in the previous and next fields (as explained in Step 6 of FIG. 5/1 and illustrated in FIG. 3) The minimum-related average of current spatial pixels refers to a directional average of pixels in the same frame as the missing pixel (as explained in Step 5 of FIG. 5/1 and illustrated in FIG. 3). Statement (i) also uses the term "Min-Sigma," which is a minimum value of standard deviations of known pixel values in the same field as the missing spatial pixel. The equation for Sigma is given in Step 7 of FIG. 5/2. As defined therein, Sigma is not a "linear

combination" but is rather an absolute value of a linear combination. An absolute value of a linear combination is not a linear combination. Min-Sigma, which is defined in Step 8 of FIG. 5/2, is also not a linear combination. In statement (i), K0 is a constant. Statement (i) forms a linear combination from Sigma and Min-Sigma, which can more readily be seen by subtracting Min-Sigma from each side to yield:

Sigma – Min-Sigma <= K0

In terms of the linear combination equation shown in paragraph 20, x is Sigma, y is Min-Sigma, a=1, and b= -1. A logical operation is formed by comparing the linear combination of Sigma – Min-Sigma with K0 with the less than or equal to operator (<=).

25. Statements (ii)-(viii) in paragraph 23 include the expression abs(m_T-x_i). The variable m_T is described as an "average of temporal pixels" in the '842 Patent. This temporal pixel average is a linear combination as illustrated in Step 6 of FIG. 5/2 of the '842 Patent. The variable x_i is the value of a spatial pixel, where the subscript i is an index that identifies the particular pixel. Thus, the expression abs(m_T-x_i) is an absolute value of a difference between an average of known values of temporal pixels and a known value of a spatial pixel. Statements (ii)-(viii) do not form linear combinations from the abs(m_T-x_i) expression. Nor is the expression itself a linear combination. Instead, in statements (ii)-(viii), the absolute value of a difference between an average of known values of temporal pixels and a known value of a spatial pixel is compared to a constant (i.e., one of A1 to A6). The logical operation (less than, which is represented as "<") is not evaluated on a linear combination of values in statements (i)-(viii).

26. Step 10 of FIG. 5/2 also refers to the variable m_j. This variable is an average of known values of spatial pixels. The average of known values of spatial pixels is itself a linear combination of values as illustrated in Step 8 of FIG. 5/2. These averages are also called "the directional averages" at column 9, lines 41-44 of the '842 Patent.

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
CIVIL MINUTES - GENERAL

CASE NO(S): Date: January 10, 2013

LA12CV05707-MRP (Ex) OPLUS TECHNOLOGIES, LTD.,, v. SEARS HOLDINGS CORPORATION, ET AL.,

==

PRESENT: THE HONORABLE MARIANA R. PFAELZER, SENIOR U.S. DISTRICT JUDGE

Cynthia Salyer
Courtroom Clerk

Anne Kielwasser
Court Reporter

ATTORNEYS PRESENT FOR PLAINTIFFS:

DANIEL FERRI
KARA SZPONDOWSKI
SHAUN SWIGER

ATTORNEYS PRESENT FOR DEFENDANTS:

ADRIAN PRUETZ
CHARLES KOOLE
STEVEN HANSEN, for Vizio

PROCEEDINGS: CLAIM CONSTRUCTION HEARING (held & completed):

The case is called and appearances are made. Court and counsel discuss the claims and terms at issue. The Court takes this matter under submission its order will follow. The hearing on the Motion for Summary Judgment is scheduled for February 27, 2013 at 11:00 a.m.

MINUTES FORM 11
CIVIL - GEN

Initials of Deputy Clerk cs
TIME: 2/0

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

Oplus Technologies, Ltd., Plaintiff, v. Sears Holding Corporation; Vizio, Inc., Defendants.	Case No. 12-cv-5707-MRP **Claim Construction Order**

I. Introduction

Oplus Technologies, Ltd., ("Oplus") has sued Sears Holding Corporation and Vizio, Inc. (collectively "Vizio") for infringing two signal processing patents:

(1) United States Patent No. 6,239,842 (filed Dec. 18, 1998) ("the '842 patent"), entitled "Methods of De-Interlacing Video Signals Using a Mixed Mode Spatial and Temporal Approximation Technique;" and

(2) United States Patent No. 7,271,840 (filed Oct. 31, 2002) ("the '840 patent"), entitled "Method for Determining Entropy of a Pixel of a Real Time Streaming Digital Video Image Signal, and Applications Thereof").

The asserted claims are: (1) Claims 7, 8, 9, 14, and 15 from the '842 patent; and (2) Claims 56, 57, 58, 59, and 62 from the '840 patent. The parties dispute the meaning of eight claim limitations. The Court construes these eight terms in this Claim Construction Order.

II. Technical Background

A. '842 patent

The '842 patent converts a video signal from an interlaced format to a de-interlaced format. The process is called interlacing.

An image can be represented mathematically as a function of two variables, i.e., f(x,y), where 'f' is the intensity or color value of the image at spatial coordinates 'x' and 'y.' Video effectively adds a third variable to the equation, time 't,' and can be represented as f(x,y,t). For each instant of time 't,' the video is essentially a unique image. The video as a whole is a sequence of images for different times 't.' For a *digital* image, 'f' is a discrete function, i.e. f[x,y], which can be represented as a two-dimensional *matrix*. A corresponding *digital* video signal, likewise, is described by f[x,y,t], i.e., a three-dimensional *matrix*.[1] In the discrete-time (digital) domain, time 't' is quantized into frames ('n') yielding f[x,y,n]. Multiplying the

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[1] Conceptualizing a video as a 3D matrix for use in mathematically-oriented programming languages such as MATLAB is commonplace in the field of digital signal processing. In one study, for instance, "[t]he video data was arranged as an N by M by T matrix where N is the number of pixels in the x-direction, M the number in the y direction, and T the number of video frames." Elias, D. & L. Bruce, *Classification of Behaviors by Motion Estimation of Visual Stimuli*, available at http://people.ece.cornell.edu/land/PROJECTS/MotionDamian/index.html (last accessed on January 10, 2013).

frame number with the frame rate would reveal the corresponding time 't' for any given frame number.

Each frame number corresponds to a different *slice* of the 3D video matrix, i.e. a 2D image matrix. An individual slice, i.e., a singular video "frame," therefore, is a 2D image matrix. This matrix is essentially a grid of picture cells, i.e., "pixels." Video signals are represented by two types of signals: progressive-scan and interlaced. Progressive-scan video signals store values for *all* pixels in each video frame. Put another way, if one were to envision a video frame as a matrix, a progressive-scan video frame would *assign image-intensity values* to all picture cells in the matrix. Interlaced video signals, by contrast, break out each video frame into two composite sub-frames called "fields." Each frame has two fields. Image intensity values are assigned to *only* odd-numbered rows in the first field and even numbered rows in the second field (or vice versa). Picture cells in the unassigned rows remain unassigned. Interlacing is beneficial for saving bandwidth resources as well as reducing a user's perception of image flicker.

Because modern display systems are not able to work in interlaced mode (e.g., LCD, plasma displays, etc.), it is beneficial to convert interlaced video into progressive video, a transformation known as de-interlacing. The '842 patent describes methods of de-interlacing video signals by estimating values for the missing pixels in each field by using available image intensity information about

Case: 14-1297 Document: 44-1 Page: 244 Filed: 01/23/2014

surrounding pixels in the same field as well as pixels in adjacent fields. Put another way, the ’842 patent de-interlaces video signals by interpolating values of missing pixels in space and time.

B. ’840 patent

The ‘840 patent is directed toward determining the entropy of a pixel of a real time streaming digital video image signal. The patent also discloses a technique of automatically correcting an error produced during real time editing of the video signal.

Entropy, in the abstract, captures the extent of disorder or randomness in a system. In the image processing context, entropy captures an index of “busy-ness” in an image. Background portions of an image convey less useful information than non-background portions. Algorithmically discriminating between the background and object of the image is useful in certain contexts. For example, when one uploads a passport-sized photograph on a social networking website, one can center the image appropriately if one knows which portion of the image is the headshot and which portion is the background.

Background portions have low entropy because the pixels are uniform in their intensity values (e.g., background of the sky or a wall). Given this uniformity, there is a high state of *order* and a corresponding low state of *disorder*, i.e., low entropy. Because low-entropy areas typically provide less useful information about

an image than high-entropy areas, the concept of pixel entropy can be employed to achieve a variety of image processing goals. Applications are not limited to two-dimensional images. Consider the generation of exemplar thumbnails (still images) from video files for use in a video portal like YouTube. Without deploying an entropy-based algorithm, one "might end up having thumbnails that show a black scene or some scene that barely shows anything. Using the image entropy, you can sort out the thumbnails based on the *busy*-ness [sic] of the scene they depict." See Dejan Noveski, *Calculating Image Entropy With Python, How and Why?*, available at http://brainacle.com/calculating-image-entropy-with-python-how-and-why.html (last accessed on January 10, 2013).

In sum, entropy is a useful concept in signal processing. The '840 patent describe methods of: (1) *determining* pixel entropy in a real time streaming digital video image signal; and (2) automatically correcting an error produced during real time editing. '840 patent at col. 25 II. 22-25 (Claim 56) (Claims 57, 58, 59, and 62 are dependent claims to Claim 56, the sole independent asserted claim).

III. Principles of Claim Construction

The purpose of claim construction is to determine the meaning and scope of the patent claims asserted to be infringed. *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co., Ltd.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008). Claim construction is a pure question of law. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996). For

purposes of claim construction, the Court reviews both intrinsic and extrinsic evidence, placing emphasis on the former.

A. Intrinsic Evidence.

i. Claim Language

"The words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.*¸ 415 F.3d 1303, 1312 (Fed. Cir. 2005) (citation omitted). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1313. "The inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation." *Id.* "That starting point is based on the well-settled understanding that inventors are typically persons skilled in the field of the invention and that patents are addressed to and intended to be read by others of skill in the pertinent art." *Id.*

ii. Specification

The specification is "always highly relevant to the claim construction analysis." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995). As Judge Rich wrote shortly after the creation of the Federal Circuit, "the specification . . . is the primary basis for construing the claims." *Standard Oil Co. v. Am.*

Cyanamid Co., 774 F.2d 448, 452 (Fed. Cir. 1985). "[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs." *Phillips*, 415 F.3d at 1316. "In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor." *Id*. In such cases, the inventor's intention as expressed in the specification "is regarded as dispositive." *Id.*

iii. Prosecution History

The Court also considers the patent's prosecution history, if it is in evidence. "The prosecution history, which we have designated as part of the "intrinsic evidence," consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent." *Id.* The patentee created the prosecution history much like the specification in an attempt to explain and obtain the patent, and thus the prosecution history provides evidence about how the PTO and the inventor understood the patent. *Id.* "Yet because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* "Nonetheless, the prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether

the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

B. Extrinsic Evidence

In addition to using intrinsic evidence, this Court is also authorized to use extrinsic evidence in claim construction. *Phillips*, 415 F.3d at 1317 ("[W]e have . . . authorized district courts to rely on extrinsic evidence . . . ."). Extrinsic evidence "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Id*. While extrinsic evidence can shed light on claim meaning, it is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Id*. (citation omitted). Finally, extrinsic evidence is "unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Id.* at 1319.

IV. Claim Construction

A. "spatial field," '842 Claims 8, 9, 14, 15; "temporal field," '842 Claims 8, 9, 14, 15; "spatial pixel," '842 Claims 7, 8, 9, 14, 15; "temporal pixel," '842 Claims 7, 8, 9, 14, 15

Interlaced videos are sequences of successive fields. Fields are grids containing rows and columns of pixels. Interlaced videos, therefore, are *sequences of* grids of rows and columns of pixels. Fields and pixels are neither "spatial" nor "temporal" in a vacuum. Instead, "spatial" and "temporal" are relativistic modifiers describing

relationships between underlying entities, i.e., the relationship between two pixels or two fields. The starting point is the missing pixel undergoing approximation. *See* '842 at Fig. 4 (flowchart with step (4): "Identify **a** missing pixel to approximate its value").

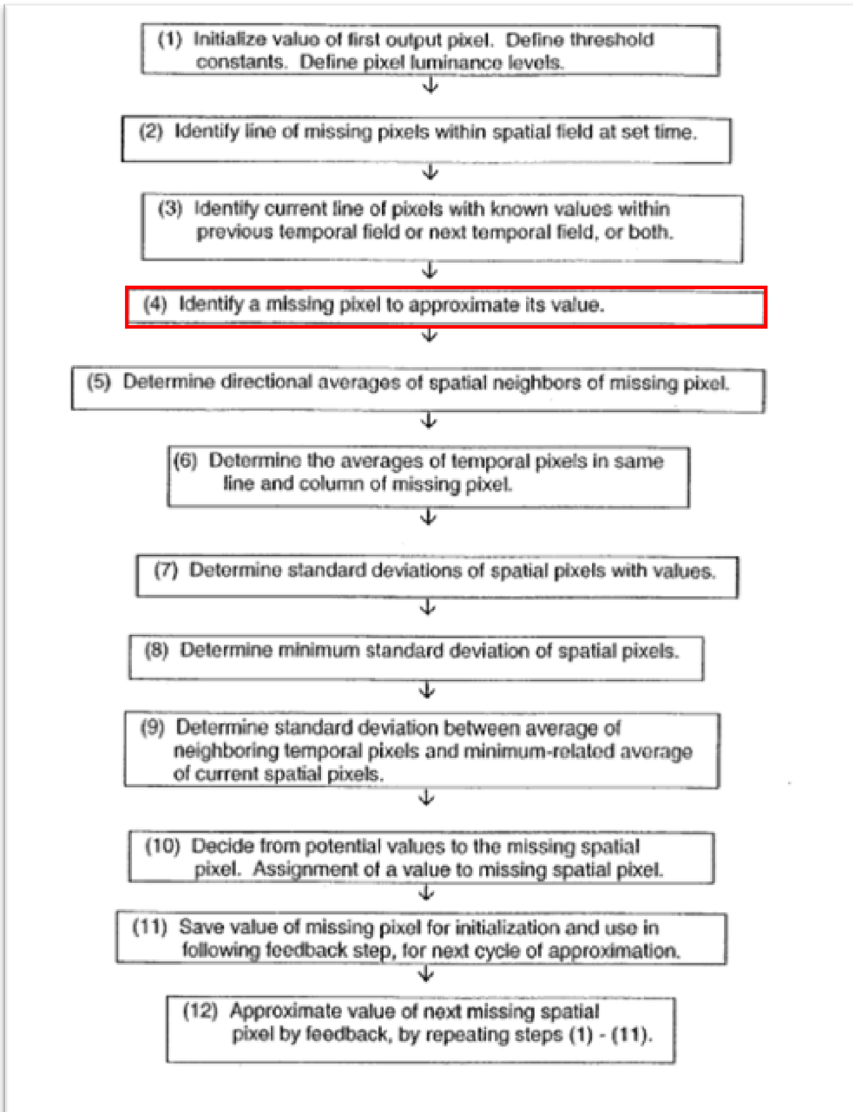

FIG. 4

The field containing the pixel-undergoing-approximation is the "spatial field" relative to ***that*** pixel. ***All other fields*** in the interlaced video signal are "temporal fields" relative to the pixel-undergoing-approximation.[2] All pixels *in the same field* as the pixel-undergoing-approximation are "spatial pixels." Put another way, all pixels in the spatial field are special pixels. Similarly, all pixels in *different* fields than the pixel-under-approximation are temporal fields, i.e., all pixels in the temporal fields are "temporal pixels." Thus, the claim terms "temporal field," "spatial pixel," and "temporal pixel" are all defined *relative* to the "spatial field," which in turn is defined *relative* to the pixel-undergoing-approximation. The relativistic nature of these constructions is necessary because the underlying concepts do not exist absolutely. Interlaced video signals, by themselves, do not contain "spatial" and "temporal" pixels and fields. Pixels and fields assume "spatial" and "temporal" status only vis-à-vis individual pixels-undergoing-approximation.

The Court rejects the parties' proposals for these claim terms. For "[spatial/temporal] field," Oplus proposes "a field as it pertains to [space/time]." But every [field/pixel] in an interlaced video signal *pertains* to space and time in

[2] The Court does not limit the scope of temporal fields to the two fields immediately adjacent to the spatial field containing the pixel-undergoing-approximation. The patent's use of the phrase "immediate previous said temporal field" indicates that temporal denotes *any* field related temporally to the spatial field (which contains the pixel-undergoing-approximation), i.e., all other fields. One could plausibly argue that the spatial field containing the pixel-undergoing-approximation is also temporally related to itself by an identity relationship, e.g., a "current temporal field" versus a "previous/next temporal field." The Court acknowledges that Oplus has invoked the phrase "current temporal field" in its brief, albeit with reference to the '840 patent but not the '842 patent. Oplus's Responsive Claim Construction Brief at 14.

some sense. Every pixel, for example, pertains to *space* because it has a row number and a column number which reference the pixel's horizontal and vertical coordinates. Also, every pixel *pertains* to time because it is associated with a field which, in turn, is associated by time when multiplied by the field rate or the frame rate. Oplus's proposal, therefore, is unhelpful and lacks a relativistic definition for this claim term – a type of definition the Court finds necessary.

For "spatial field," Vizio proposes "the field consisting of all pixels ***displayed at the same time*** as the current pixel." Except for the bolded portion, the Court's construction is identical to Vizio's. The Court first notes that the phrase "missing pixel" is somewhat misleading. A pixel is a "picture cell" in a grid of rows and columns, i.e., a placeholder of value. The picture cell never goes missing from the field. Its horizontal and vertical coordinates are known and unchanging. What the pixel itself is *missing* is an assignment of value. The picture cells forming the grid-shaped arrangement do not lose their membership in the grid simply because they temporarily lack assigned values. This conclusion finds support in the patent specification.[3] Step (10) of Figure 4, for example, requires an "[a]ssignment of a value to a missing spatial pixel."

[3] Though the patent states that "each field ***contains half*** the entire number of horizontal lines on an image frame as displayed on a TV screen," '840 at col. 10 II. 63-66 (emphasis added), other portions of the patent specification refer to "the current spatial field" as "featuring known ***and missing*** values of spatial pixels . . . ." '842 patent at col. 4 II. 2-3. Step (2) of Figure 4 states, "Identify line of ***missing pixels within spatial field*** at set time." (emphasis added).

For “temporal field,” Vizio proposes “a field displayed at a different time than the spatial field.” This proposal is almost identical to the Court’s construction. But the Court notes that the governing domain for a *digital* video signal is the discrete-time domain – not the continuous-time domain. Discrete-time signals quantize time thereby necessitating the employment of an index (such as a frame or field number). Discrete-time signals such as digital video signals do not exist in the time domain in the pure sense. Time information about a frame can be derived by multiplying a frame number by the frame rate. That said, any difference in index numbers corresponds to “a different time,” rendering Vizio’s proposal essentially correct. Still, to stay true to the discrete-time nature of the signals undergoing processing in the ‘842 patent, the Court does not adopt Vizio’s construction.

The Court’s construction is identical to Vizio’s for “[spatial/temporal] pixel.” Oplus proposes “a pixel displaced ***in a horizontal and/or vertical directions***” for “spatial pixel.” Figure 3 of the ‘842 patent illustrates horizontally and vertically displaced pixels. But ***all*** pixels in the same field other than the pixel-undergoing-approximation are horizontally and/or vertically displaced pixels relative to the pixel-undergoing-approximation. Oplus’s proposal for a “temporal pixel,” i.e., “a pixel as it pertains to time,” shares the same defect as its proposal for “[spatial/temporal] field” – it is redundant.

The Court finds that a “spatial field” is “the field containing the pixel-undergoing-approximation.” The “temporal field” includes “all fields other than the spatial field.” A “[spatial/temporal] pixel” is a “pixel in [the/a] [spatial/temporal] field.”

B. “real time,” ’840 Claims 56, 57, 58, 59, 62

For “real time,” Oplus proposes “computation or processing, ***for example editing and streaming video signal***, done in the present to control physical events occurring in the present.” Vizio proposes “computation or processing done in the present to control physical events occurring in the present.”

Exemplars provide illustrations or examples for concepts. Not definitions. The parties, therefore, do not have a claim construction dispute about ***the definition*** of “real time.” Their disagreement is limited to the inclusion of exemplars. The Court finds that Oplus’s exemplar is unnecessary because the claim language itself recites “real time editing” and “real time streaming digital video image input signal.” Substituting Oplus’s exemplar-laden proposal into the claim term “real time” in these phrases reveals the redundancy of Oplus’s proposal.

“Claim construction is a matter of resolution of ***disputed meanings*** . . . not an obligatory exercise in redundancy.” *U.S. Surgical Corp. v. Ethicon*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). Here, the parties agree about the meaning of “real time.” No construction is therefore necessary because of the lack of a dispute.

C. "streaming digital video image input signal," '840 Claims 56, 57, 58, 59, 62

The Court finds that this claim term needs no construction. The noun in this phrase is "signal." A signal can serve as an input or an output. Here, the claim covers an "*input* signal." An input signal can represent audio, image, communication, etc. The claim covers an "*image* input signal." An image input signal can depict a picture or a video. The claim covers a "*video* image input signal." Video image input signals can exist on a continuous-time domain (analog) or a discrete-time domain (digital, i.e., in frames per second). The claim covers a "*digital* video image input signal." The data delivery methodology for such a digital video image signal can be non-streaming (e.g., an optical disc such as a DVD) or streaming (of the sort pioneered by RealNetworks[4]). The claim covers a "streaming digital video image input signal."

Understanding the meaning of a "streaming digital video image input signal" is no more complicated than understanding the meaning of a "bouncy red large beach ball." A string of adjectives does not render a phrase ripe for claim construction. Furthermore, the ordering of modifiers makes no difference for this claim term. A streaming digital video image input signal is at once a streaming signal, a digital signal, a video signal, an image signal, and an input signal. Much like a bouncy red large beach ball is at once a bouncy ball, a red ball, a large ball, and a beach ball.

[4] *See* RealNetworks, available at http://www.realnetworks.com/our-story/ (last accessed on January 11, 2013).

Furthermore, neither party has advanced any evidence indicating that the unitary phrase "streaming digital video image input signal" assumes a different meaning than its individual parts. Vizio quotes step (b) of Claim 56 of the '840 patent:

> (b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal **interlaced sequence of three consecutive fields** in a global input grid of pixels included in the streaming digital video input image signal.

'840 patent, Claim 56(b) (emphasis added).

The Court agrees with Vizio's self-evident statement that the bolded portion indicates that the '840 patent "describes a streaming digital video image input signal ***in the context of interlaced video***."[5] Vizio's Responsive Claim Construction Brief at 11. But the Court rejects Vizio's subsequent argument that "the asserted claims are expressly directed to interlaced video, ***so*** a definition related to non-interlaced video would unnecessarily confuse the meaning of the term as used in the asserted claims." *Id.* at 13 (emphasis added). Not so. A patent claim's express recitation of a device *in the context of* an operating environment does not warrant a claim construction for the device *limiting its usage to that operating environment*. The claim language serves that limiting function. Vizio's proposal amounts to a request for the insertion of a reminder – that Claim 56(b) involves an "interlaced

[5] This is self-evident because the mere existence of the phrase "interlaced sequence of three consecutive fields" in the claim language indicates that Claim 56(b) involves the *context* of interlaced video.

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sequence of three consecutive fields" – *into* the construction for the claim term "streaming digital video image input signal." A request for such a reminder is perplexing given that the only claim language separating "streaming digital video image input signal" from "in a temporal interlaced sequence of three consecutive fields" ***is a comma***.

Oplus, on the other hand, proposes "an ***electronic*** signal from ***any*** source (e.g. film movie, video camera, or graphics) which carries an image, sent in such a way as to simulate real time delivery)". This Court rejects this construction because: (1) the proposal covers analog signals which are outside the scope of the claim language; and (2) electronic signals from *any* source can include audio and communication signals notwithstanding Oplus's image-based exemplars.

"In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005). "[S]treaming digital video image input signal" is an example of such readily apparent claim language. No construction is needed.

The patent specification[6] and file history reveal no special definition differing from the plain and ordinary meaning.

D. "local neighborhood of neighboring pixels," '840 Claims 56, 57, 58, 59, 62

The claimed methods of determining pixel entropy contain a step requiring "assigning and characterizing a ***local neighborhood of neighboring pixels*** to each input image pixel . . . ." '840 col. 25 II. 30-32 (Claim 56(b)). Vizio's graphical illustrations, reproduced below, are accurate representations of the embodiment described in the patent specification.

The '840 specification describes two separate local neighborhoods of neighboring pixels. The *first* "local neighborhood of neighboring pixels" is assigned to the *virtual* pixel and includes: (1) M columns to the right and left of the virtual pixel; and (2) L rows above and below the virtual pixel. Because the row containing the virtual pixel itself is empty, that row does not count. Consequently, the neighborhood has a size of (2L)(2M+1).[7]

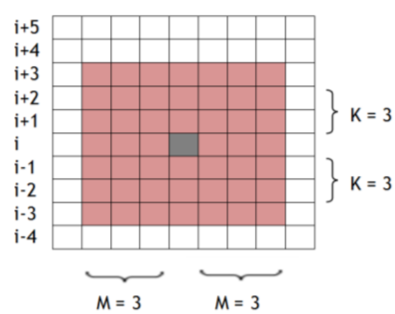
The *second* "local neighborhood of neighboring pixels" is assigned to "***each pixel located in the previous [temporal] field***" and "***each pixel located in the next***

[6] The patent states, "A streaming digital video image signal is represented as continuous sequences of either fields, according to an interlaced scan refresh format, or frames, according to a non-interlaced or progressive scan refresh format." '840 at col. 1 II. 24-27. This does not amount to a definition of "streaming digital video image signal." It only describes possible ways in which such a signal can be *represented*. Patents often flesh out, in varying levels of detail, various attributes or forms that objects can assume. That does not justify adopting treatises on each subject for purposes of claim construction.

[7] Had the row containing the missing pixel *counted*, the neighborhood size would have been (2L+1)(2M+1).

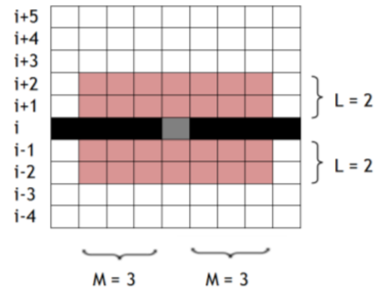
[temporal] field." '840 at col. 11 II. 25-27. The foregoing references to temporal fields do not describe the "local neighborhood of neighboring pixels" itself. Instead, they point out that the *pixels* relating to the second local neighborhood of neighboring pixels are *themselves* located in previous and next temporal fields. Put another way, with respect to the *virtual* pixel, the pixels associated with the second "local neighborhood of neighboring pixels" are *temporal pixels*. The "local neighborhood of neighboring pixels" of these *temporal pixels* are described as the (2K+1)(2M+1) neighboring pixels ***within the same previous or next field***. Relative to the pixels to which they are assigned, pixels in the "local neighborhood of neighboring pixels" *are* spatial pixels.

Oplus cites sub-step (ii) of Step (b) of Figure 1 to support its proposal, which recites "one or more pixels sufficiently near the input pixel ***in time*** or space to be useful for the purpose of comparison." Sub-step (ii) contradicts Oplus's proposal and confirms Vizio's proposal. Sub-step (ii) describes the assignment of a second local neighborhood of neighboring pixels to each pixel located in previous and next temporal fields. Critically, the "local neighborhood of neighboring pixels" are ***assigned to*** an input pixel. With respect to that input pixel, these local



neighborhoods of neighboring pixels are, as Vizio proposes, "a surrounding region of rows and columns of neighboring pixels."

Where the input pixel is a virtual pixel, however, the local neighborhood is "a surrounding region of rows and columns of neighboring pixels excluding the row containing the virtual pixel."



The Court therefore finds that "a local neighborhood of neighboring pixel" is "a surrounding region of rows and columns of neighboring pixels within the same spatial field as the input pixel, except where the input pixel is a virtual pixel in which case the row containing the virtual pixel is omitted."

E. **"counter," '840 Claims 56, 57, 58, 59, 62**

As a preliminary matter, the Court analyzes whether section 112 ¶ 6 applies to the claim term "counter" and determines that it does not. The claim term "counter" is unencumbered by the words "means" and "for," thereby raising a rebuttable presumption against applying section 112 ¶ 6. Ordinarily, the Court would have required Vizio, at this juncture, to meet a burden of producing evidence to rebut the presumption against ¶ 6's applicability by demonstrating that the claim term "counter" fails to recite sufficiently definite structure or else recites a function without reciting sufficient structure for performing that function. But here, given

the usage of "counter" in common parlance, the claim term *by itself* recites sufficient structure to avoid application of section 112 ¶ 6 *despite* (1) its coverage of a broad class of structures and (2) its identification of structures by their function, i.e., counting.[8] *See Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.2d 1354, 1359-60 (Fed. Cir. 2004) ("[W]e have held that it is sufficient if the claim term is used in common parlance . . . to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function.").

Vizio proposes "a variable with an initial value of 0 that can be increased by 1 if certain criteria are met." Vizio's Responsive Brief at 18. Oplus argues that Vizio's proposal is defective because it imports limitations from the specification into the claim by limiting the counter's initial value to 0 and increment size to 1 just because the specification uses those values in a described embodiment. Vizio rebuts Oplus's charge by characterizing the iterative process described in the '840 specification (col. 14 II 27-54) as ***the only disclosure*** of an initial value and an increase in the value in the '840 patent.

[8] *But see* Mark A. Lemley, *Software Patents and the Return of Functional Claiming*, Stanford Public Law Working Paper No. 2117302 (July 25, 2012) (arguing that claim limitations like "data transmitter," "data receiver," etc. cover a genus of possible implementations and are effectively unlimited as a matter of structure). "The function [these claim limitations] perform may be simple or complex, broad or narrow, but in the modern world [they] cover ***any device*** that performs that function in any way . . . The absence of a real hardware limitation wouldn't be such a problem if the patentee's claim were limited to a particular software implementation of the invention. In fact, however, those claims are rarely limited to a particular software algorithm . . . That is, the patentee claims the end it accomplishes, not the means of getting there." *Id.* at 18.

But "even where a patent describes ***only a single embodiment***, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words of expressions or manifest exclusion or restriction." *Arlington Indus., Inc. v. Bridgeport Fittings*, 632 F.3d 1246, 1254 (Fed. Cir. 2011) (citations omitted). Nothing in the specification or file history demonstrates the patentee's clear intention to limit the counter's initial value to 0 or the increment size to 1. Consequently, the Court rejects Vizio's proposal.

Oplus proposes "a device such as a circuit or a programmable processor, used to track the value of pixel local neighborhood parameters in order to calculate a value of entropy." Again, Oplus inserts exemplars such as circuits and programmable processors to illustrate or exemplify – not define – the construed claim term. The Court does not adopt Oplus's proposal.

The Court finds that the claim term "counter" requires no construction. Counters in signal processing algorithms denote adequate structure on account of their usage in common parlance. They include the genus of possible ways of implementing the function of counting yet do not implicate ¶ 6 because the presumption against ¶ 6's applicability is not overcome given the usage of the word "counter" in the common parlance.

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V. Conclusion

The Court has reviewed the parties' disputes and has construed eight claim terms from the '840 and '842 patents. The following table summarizes the Court's findings.

Claim	Claim Term	Claim Construction
'842, Cl. 8, 9, 14, 15	"Spatial Field"	"the field containing the pixel-undergoing-approximation."
'842, Cl. 8, 9, 14, 15	"Temporal Field"	"all fields other than the spatial field."
'842, Cl. 7, 8, 9, 14, 15	"Spatial Pixel"	"pixel in the spatial field."
'842, Cl. 7, 8, 9, 14, 15	"Temporal Pixel"	"pixel in a temporal field."
'840, Cl. 56, 57, 58, 59, 62	"Real Time"	No Construction
'840, Cl. 56, 57, 58, 59, 62	"Streaming Digital Video Image Input Signal"	No Construction

Claim	Claim Term	Claim Construction
‘840, Cl. 56, 57, 58, 59, 62	“Local Neighborhood of Neighboring Pixels”	“a surrounding region of rows and columns of neighboring pixels within the same spatial field as the input pixel, except where the input pixel is a virtual pixel in which case the row containing the virtual pixel is omitted.”
‘840, Cl. 56, 57, 58, 59, 62	“Counter”	No Construction

IT IS SO ORDERED.

DATED: January 14, 2013

Hon. Mariana R. Pfaelzer
United States District Judge

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IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (E) *Assigned to the Honorable Mariana R. Pfaelzer* **OPLUS' RESPONSE IN OPPOSITION TO VIZIO'S MOTION FOR SUMMARY JUDGMENT** Date: February 27, 2013 Time: 11:00 a.m. Place: Courtroom 12

operations;" and b) using the "values" of the Markush group "to *form linear combinations* on which the logical operations are performed." (Vizio Br. at 5, italics in original). As with its analysis of the "plurality of constants," Vizio's argument involves a false premise that seeks to read in language (e.g., "forming") found nowhere in the claim language itself.

The '842 specification supports the view that each of the members of the Markush group are values that include linear combinations, either alone or in combinations with additional mathematical steps. As even Vizio (and its proferred expert) admit, the Markush group includes averages of known temporal pixel values (mT), which are by themselves a linear combination of values (See D.I. 101-16, Hemami Decl. at ¶25 and Szpondowski Decl. ¶3, Ex. B, '842 patent, Fig. 5/2).

Likewise, the Markush group includes averages of known spatial pixels values (m_j), which is by itself a linear combination of values (See D.I. 101-16, Hemami Decl. at ¶26 and Szpondowski Decl. ¶3, Ex. B, '842 patent, Fig. 5/2). Vizio admits that the "Sigma" or "Min-Sigma" values in the specification are absolute values of a linear combination. (See D.I. 101-16, Hemami Decl. at ¶24). Put another way, Vizio admits that the standard deviation functions of the '842 patent are linear combinations of values plus further mathematical steps. (See also, Ferraro Decl. at ¶30). Accordingly, each of the linear combinations of values listed in the Markush group includes what Vizio admits to be values of linear combinations, either by themselves or with further mathematical steps added.

In addition, the specification shows that the "logical operations" involve linear combinations of the values that fall into the Markush group. Each of the statements in the logical operations that involve "absolute value" functions are used to form, and do form, linear combinations from the absolute value expression (i.e., one of the values in the Markush group). (Ferraro Decl. at ¶31).

V. CONCLUSION

For the reasons set forth above, Vizio's Motion for Summary Judgment of Invalidity of U.S. Patent Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. §§ 101 and 112 should be denied.

Respectfully submitted,

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IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (E) *Assigned to the Honorable Mariana R. Pfaelzer* **DECLARATION OF RICHARD FERRARO IN SUPPORT OF PLAINTIFF'S RESPONSE TO DEFENDANT'S MOTION FOR SUMMARY JUDGMENT OF INVALIDITY** Date: February 27, 2013 Time: 11:00 a.m. Place: Courtroom 12

I, Richard Ferraro, declare that:

1. I obtained a Bachelor of Science degree in Electrical Engineering from Purdue University in 1972, and a Master of Science degree in Electrical Engineering from the University of Washington in 1980.

2. I am currently employed as an independent consultant, author, and inventor in the fields of computer graphics and medical instrumentation. I have invented video processing hardware and software for computers and medical instrumentation. I have consulted for various companies regarding video processing hardware, signal and image processing in the field of computer graphics hardware and software design, digital televisions, diagnostic imaging, three-dimensional graphics, JPEG and MPEG image compression, video processing, 3D real-time games, and other graphics and signal and image processing related projects. I have designed algorithms for de-interlacing that were implemented in hardware circuitry and software programs.

3. I am a named inventor on seven patents: U.S. Patent Nos. 5,052,395 (Non-invasive ultrasonic pulse doppler cardiac output monitor), 5,191,406 (Method and apparatus for rapid scanning of color images), 5,537,229 (Method and apparatus for rapid scanning of color images), 5,612,794 (Light source for an image reading device), 5,684,610 (Method and apparatus for rapid scanning of color images), 5,724,160 (Optical scanner for line scanning an original), and 5,926,289 (Image digitizing system). I developed the 35mm film scanner that became known as the Nikon Coolscan®. The Coolscan® has received numerous awards.

4. I have authored or co-authored five technical papers. I have written four technical books: *Programmer's Guide to the EGA, VGA and Super VGA Cards* (3 editions: 1988, 1990,1996), *Learn 3D Graphics Programming on the PC* (1996), *A Tutorial Guide to the Pro/Engineer Student Collection* (1998), and *A Tutorial Guide to PT/Modeler 2.0 and Pro/Engineer* (1998).

5. In preparing this declaration, I relied on my thirty-seven years of experience as an engineer, including substantial experience with video processing systems. In addition, I have previously been engaged many times as a consultant and technology expert in patent litigation dealing with issues of validity, claim construction, and infringement.

6. As described above, I have extensive knowledge in the field of video signal processing. Attached as Exhibit 1 is my most recent curriculum vitae which describes my qualifications in more detail.

7. I have been retained by Plaintiff Oplus Technologies, Ltd. to provide expert consulting services in connection with the above captioned lawsuit. I am being compensated at my standard billing rate of $600 per hour. My compensation is not contingent on the testimony that I offer in this case.

8. I have studied the two patents at issue in this case, U.S. Patent No. 6,239,842 ("the '842 patent") and U.S. Patent No. 7,271,840 ("the '840 patent") (collectively "the patents in suit"), as well as their file histories. I have also studied VIZIO's Motion for Summary Judgment of Invalidity of U.S. Patent Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. §§ 101 and 112, the Memorandum of Points and Authorities in Support of the Motion, and all associated filings, including the Declaration of Sheila S. Hemami. I wrote this declaration in response to Vizio's brief and Dr. Hemami's declaration.

I. LEVEL OF ORDINARY SKILL IN THE ART

9. The problems and solutions addressed in the patents in suit relates to video signal processing. Based on my understanding of the '840 patent and '842 patent and knowledge of the state of relevant art at the time of invention, one of ordinary skill in the art would be an electrical engineer (or equivalent) with a Master's Degree and, in addition, three to five years of work experience in the specific field of signal processing associated with video signals. I note that this is a higher bar than I

normally consider due to the very complex and detailed nature of the '842 and '840 patents at issue. These patents are not intended for a person of inadequate training and experience. Rather, these patents assume (a) an understanding of the video signal processing associated with de-interlacing video signals; (b) an understanding of the pre-editing that occurs prior to the step of de-interlacing disclosed in these patents; and (c) statistical analysis associated with the "fuzzy[1]" determination of the values for missing pixels. This level of understanding is commensurate with a Master's Degree <u>and</u> three to five years of experience in the narrow field of de-interlacing and noise reduction associated with video signals.

10. I agree, in part, with the list of skills required of one of ordinary skill as described by Dr. Hemami; however, my definition combines the two alternative definitions put forward by Dr. Hemami by combining the Master's Degree with the three years of experience. In my experience, an extraordinary student with a Master's Degree might be able to understand the technology disclosed in the '842 and '840 Patents, it is my opinion that one of "ordinary" skill would require this higher bar. [Hemami Dec., ¶10]

11. In the remainder of this declaration, when I refer to a "person of ordinary skill in the art," they will have the background and education I have just described.

II. THE '842 PATENT

A. Brief Video Processing Technology Tutorial for the '842 Patent

12. The '842 Patent is directed to the de-interlacing of video signals. An interlaced video signal consists of alternating fields of odd and even lines. Each field

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[1] A form of signal processing relies on statistics to form a "best" or "minimum error" solution. This is referred to as "fuzzy", that is, not black and white. This methodology is employed when a problem defies a single more readily deterministic approach. Fuzzy algorithms determine whether one solution is "better" or "worse" than another given the unpredictable nature of the input signal.

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is acquired at a different time. An image is composed of two fields such that the even and odd lines are alternated (thus the name interlaced). De-interlacing is the process of combining the data from these distinct fields into a single image that contains all of the lines.

13. Figure 1 illustrates a typical data flow situation as disclosed in the '842 Patent. Shown is a video camera producing an interlaced video signal which is de-interlaced and provided, as a progressive (non-interlaced) signal to a display device. The '842 Patent is directed to a method of de-interlacing. [e.g., '842 Patent, col. 1, ll. 8-11]

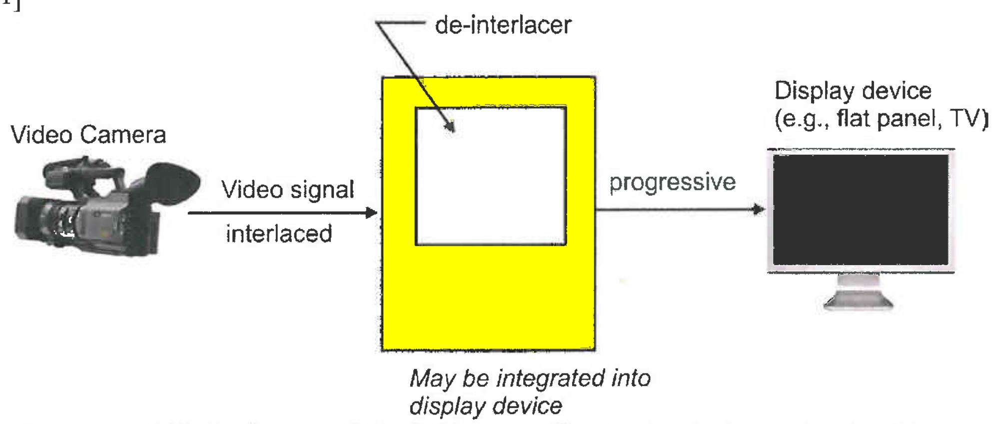

Figure 1. *Block diagram of the '842 Patent illustrating de-interlacing in the front-end editing stage and in the back-end stage as disclosed in the '842 Patent.*

14. Such a de-interlacing circuit may be found in a circuit separate from the display device (e.g., graphics card in a computer) or in the display device itself. In addition, it is well-known in the industry that an editing station may be employed to pre-process the video data before display. Such an implementation is shown in Figure 2.

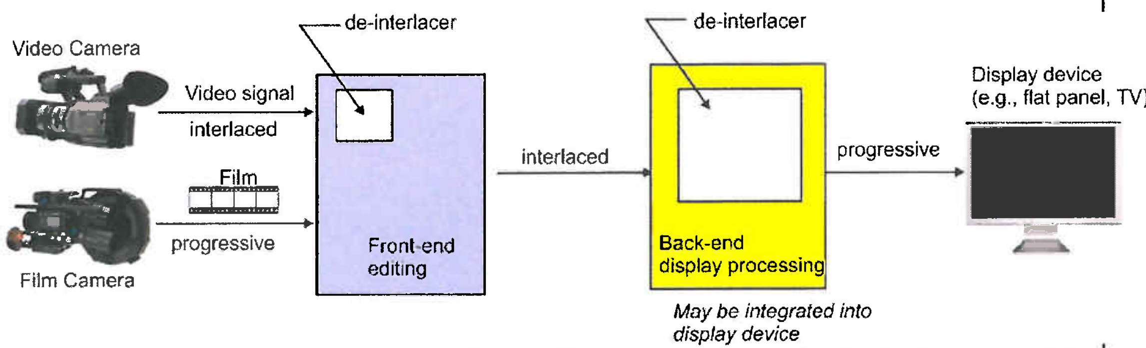

Figure 2. *Block diagram of the '842 Patent illustrating de-interlacing in the front-end editing stage and in the back-end stage as disclosed in the '842 Patent.*

15. It is very inconvenient to perform editing or image processing on interlaced signals and thus, the interlaced signals are typically de-interlaced at the editing stage. I will refer to this editing stage as the front-end. The output of the editing stage is provided to the display device which I will refer to as the back-end. The output of the editing stage may be in an interlaced or non-interlaced (i.e., progressive) format. Thus, the front-end may de-interlace the signal, process the video data, and interlace the video signal for output. If the output of the front-end editing stage is an interlaced signal, then the back-end will have to de-interlace the signal before it can be displayed, for example, on a non-interlaced display device (e.g., television or computer monitor). The back-end device may be, and often is, incorporated into the display device itself.

16. A descriptive example of the interlaced image data is shown in Figure 2. In Figure 2a, a frame of (M by N) pixels is represented showing six lines of equal value. Figure 2b and 2c illustrate the odd fields and even fields of the full frame. Note that each field has only one-half of the number of lines of the frame. Figure 2d and 2e illustrate these odd and even fields overlaid onto the full frame illustrating that missing lines of data associated with each field.

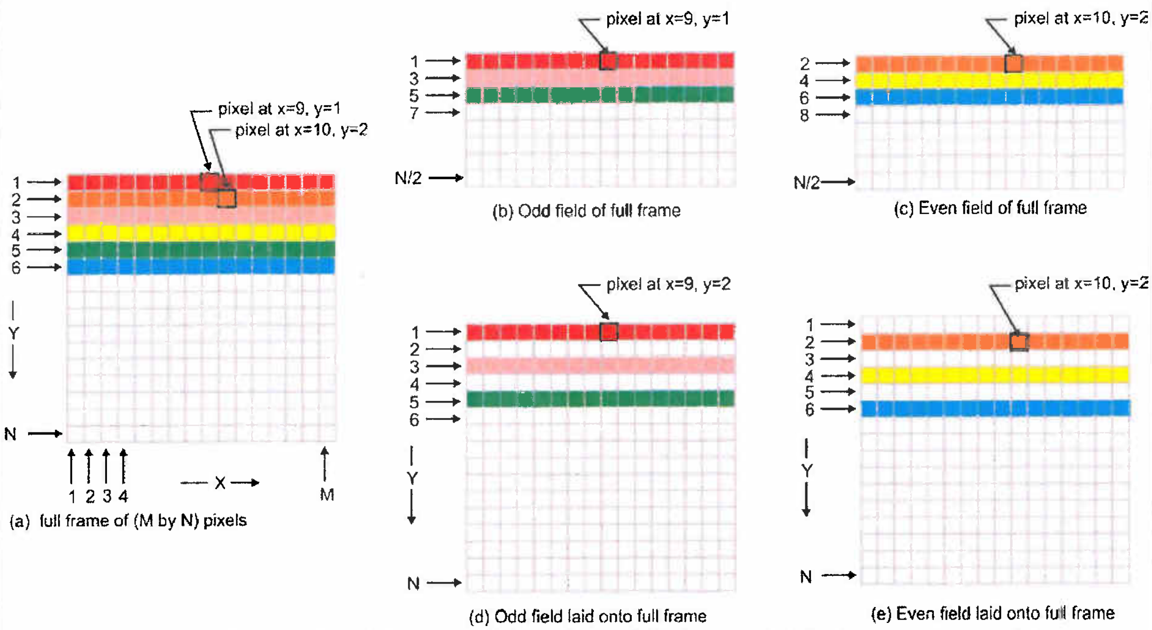

Figure 3. *Representing interlaced data. (a) a full frame of (M pixels per row × N rows per frame) with the first six lines colored and two individual pixels identified; (b) An odd field of the full frame; (c) An even field of the full frame; (d) overlaying the odd lines of the odd field onto the full frame; and (e) overlaying the even lines of the even field onto the full frame.*

17. The stated goal of the '842 Patent involves filling in these missing pixels from the interlaced input video signal in order to produce a non-interlaced output. Figure 4a and 4b illustrate overlaying the odd lines of the odd field and the even lines of the even field onto the full frame. A typical missing pixel in each are identified. Figure 4c and 4d illustrate the filling in of these pixels using only data in the respective (current) fields. A local neighborhood of size (3 by 3) surrounds the missing pixel in each case. The known pixel values within the local neighborhood are used to find a "best" approximation for the missing pixel.

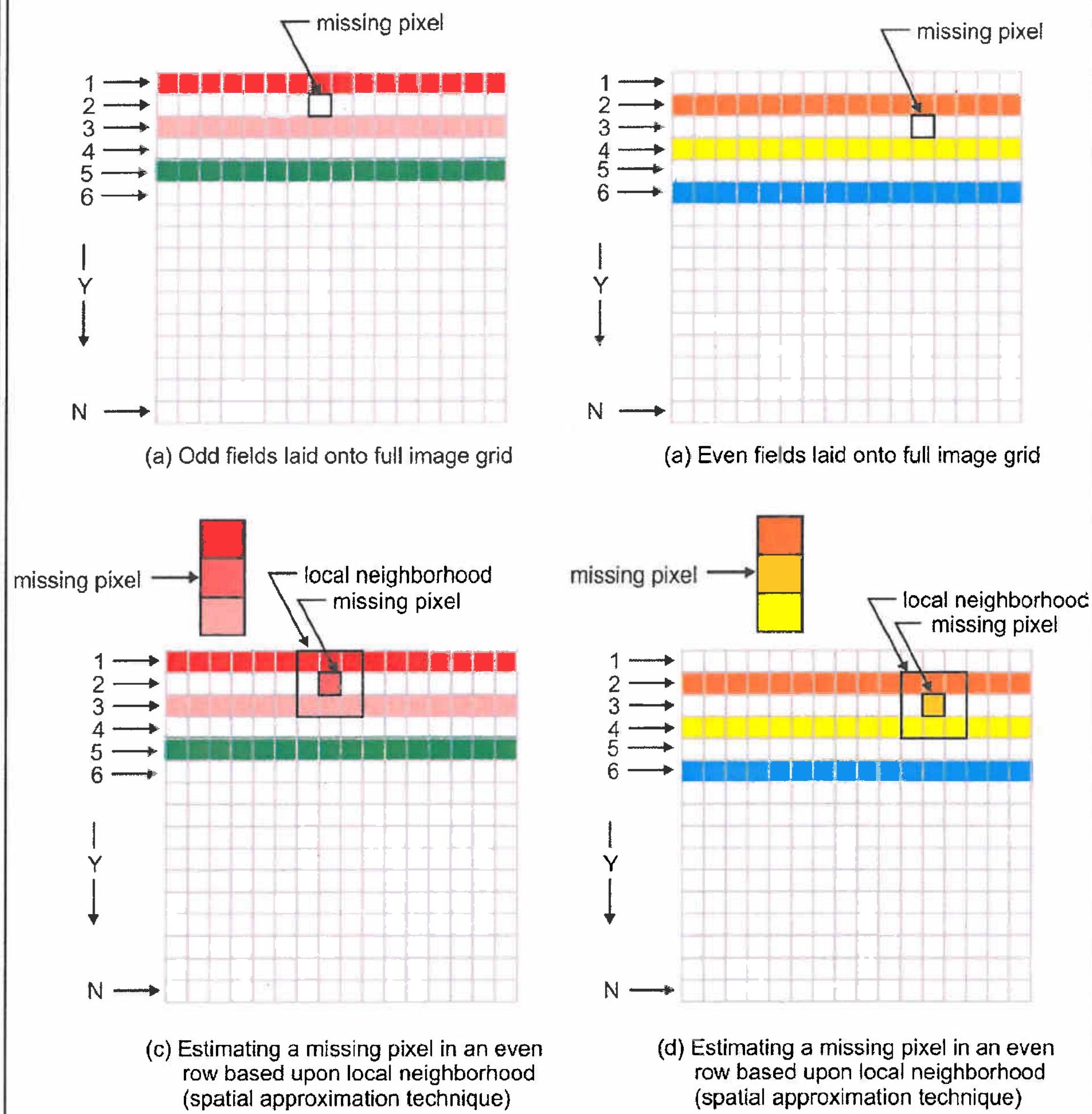

Figure 4. *Filling in a missing (virtual) pixel. (a) An odd field of the full frame identifying a missing pixel; (b) An even field of the full frame identifying a missing pixel; (c) determining a value for the missing pixel in an even line based on a local neighborhood of the odd field; and (d) determining a value for the missing pixel in an odd line based on a local neighborhood of the even field.*

18. If the subject is not moving (both the subject and the camera are still) this process of de-interlacing may simply become a process of alternating lines from

two consecutive fields into a single image. Subjects are seldom still, however, and thus combining the two fields is complicated because the subject may have moved between the two frames.

19. Figure 5 illustrates using pixel values from neighboring fields (e.g., previous and/or next). A virtual pixel is shown at the center of the local neighborhood of Figure 5b. Corresponding to the location of the local neighborhood in the current field are the local neighborhoods of the previous and next fields shown in Figure 5a and 5c.

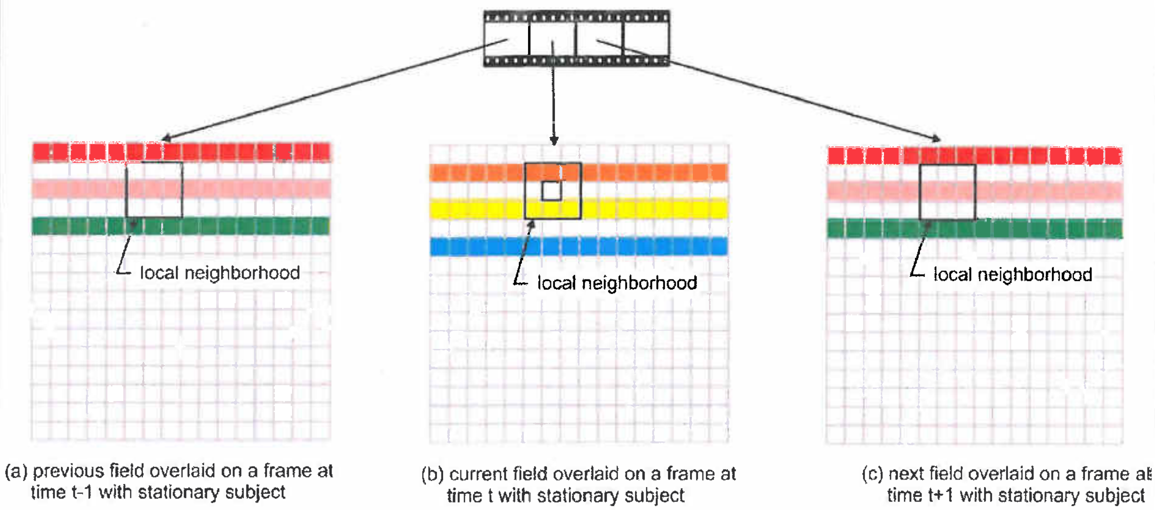

Figure 5. *Three consecutive fields superimposed onto a frame; (a) previous frame at time t-1; (b) current frame at time t; and (c) next frame at time t+1.*

20. Figure 6 illustrates an example where the subject has moved between the time that the current field, shown at Figure 6c, and the next field, shown at Figure 6b) were captured. Note that the color from lines 1, 3 and 5 of the previous field, shown at Figure 6a, are no longer captured in the next field. Figure 6d and 6e show corresponding local neighborhoods in the previous and next fields. Figure 6f provides an estimate for the missing pixel using the color from the local neighborhood from the previous, current and next fields.

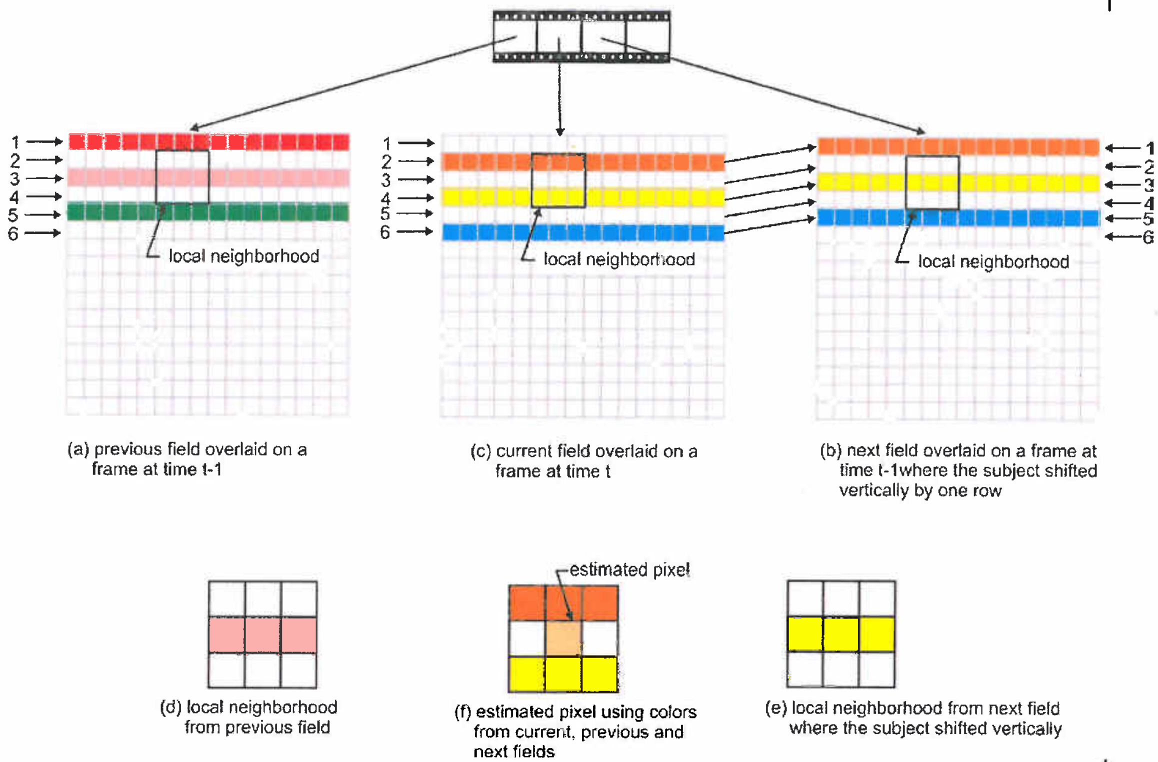

Figure 6. *Filling in a missing (virtual) pixel within a local neighborhood using a temporal approximation technique. (a) a previous field overlaid on a frame at time t-1; (b) a next field overlaid on a frame at time t+1 where the subject has shifted vertically by one row; (c) a current field overlaid on a frame at time t. (d) a local neighborhood from the previous field t-1; (e) a local neighborhood from the next field t+1;and (f) estimating a pixel based on pixel values from the local neighborhoods of the current, previous and next fields.*

B. A clear interpretation of the asserted claims of the '842 patent

21. For the reasons stated below, upon analysis of the '842 Patent, I find that there is a clear and unambiguous interpretation of the asserted claims. I find that these claims clearly define the scope of the invention. I find the claim terms in question are comprehensible and explainable to one of ordinary skill.

C. The Markush group includes a "plurality of constants."

22. There are eight possible values as enumerated in the Markush group of claim 7 and claim 14 as listed below:

#1. averages of known values of spatial pixels,
#2. averages of said known values of temporal pixels,
#3. standard deviations of said known values of said spatial pixels,
#4. standard deviations of said known values of said temporal pixels,
#5. minimums of said standard deviations of said known values of said spatial pixels,
#6. absolute values of differences between said averages of said known values of said temporal pixels
#7. said known values of said spatial pixels
#8. a plurality of constants

23. One of ordinary skill would understand the language recited in the claim 7 and claim 14 to be unambiguous. The claim recites eight items in a list #1, #2, #3, #4, #5, #6, #7 and #8. It is customary when writing a list to end the list, for example, a, b and c. If the last item is not separated from the list by an "and" delimiter, then the list would end unexpectedly.

> selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of said temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, <u>and a plurality of constants</u>, [e.g., '842 Patent, claim 7 and 14, emphasis added]

24. In addition, dependent claim 16 in the '842 Patent recites that these constants themselves can be selected from a group consisting of linear combinations. The group is listed below:

#1. a linear combination of a plurality of values of threshold constants
#2. a linear combination of a plurality of values of luminance levels of said missing pixels

25. Of further note, consistent with claim 7 and claim 14, the last item in the list is separated from the previous entries by the "and" delimiter.

> wherein said plurality of constants is selected from the group consisting of a linear combination of a plurality of values of threshold constants, <u>and</u> a linear combination of a plurality of values of luminance levels of said missing pixels. [e.g., '842 Patent, claim 16, emphasis added]

D. Linear combinations

26. Dr. Hemami has proposed an equation to generally represent a linear combination of two or more values: z = ax + by. I do not have a problem with this characterization as long as it is clear that there is nothing in the proposed definition that would preclude some or all of the constants from being a "one" (e.g., z = x + by; z= ax + y; or z = x + y). In addition, it may be that a constant itself, as used in the linear combination for that particular set of circumstances, is a "zero" resulting in the linear combination degenerating to one variable (e.g., z = ax; z=by). As described above, the '842 Patent claim 16 discloses that these constants can, in and of themselves, be chosen from linear combinations.

27. In the context of the grammar of this claim, one of ordinary skill would understand that these eight items in the list are not considered to be, in and of themselves, linear combinations. For these, in and of themselves, to be linear combinations, then example #7 and #8 would have to be, in and of themselves, considered to be a linear combination (equation in the form: z = ax + by +…) which they are not. Further, the list includes a plurality of constants, #8, that could be used in linear combination with #1-#7. The group is defined as linear combinations of #1-#8 and not one or more of items #1 through #7 in linear combination with #8.

28. One of ordinary skill would understand the claim 7 and 14 to be parsed according to their prepositional phrases. The claim recites "evaluating logical operations of linear combinations of values selected from the group…" and this would be parsed as follows: (a) evaluating logical operations; (b) of linear combinations; (c) of values selected from the group.

E. Linear combinations from the abs(mT-xi) expression

29. The '842 Patent discloses equations (iii – viii below) that are linear combinations from the abs(mT-xi) expression as listed below:

(i) Sigma<=(K0+Min-Sigma), where $-C_0$ <=K0<C_0, or
(ii) Min-Sigma >=(W-K1), where $-C_1$ <=K1<C_1, or
(iii) abs (m_T -x_1)<A1, or (iv) abs (m_T -x_2)<A2, or
(v) abs (m_T -x_3)<A3, or (vi) abs (m_T -x_4)<A4, or
(vii) abs (m_T -x_5)<A5, or (viii) abs (m_T -x_6)<A6, or
(ix) m_T <=(B+K2), where $-C_2$ <=K2 <C_2, or
(x) [(Previous-Result)-n_T <=A6] and [m_T >=W-A7], [e.g., '842 Patent, Fig. 5/2 step 10.]

30. I do not agree with Dr. Hemami's conclusion regarding statements (ii)-(viii) and whether they form linear combinations from the abs(mT-xi) expression for a few reasons. [Hemami Dec., ¶25] First, Dr. Hemami identifies statements (ii)-(viii) but statement (ii) does not contain the abs(mT-xi) expression nor is there any statement (ix). Statements (iii) through (viii) do contain the abs(mT-xi) expression. Second, these statements (iii) through (viii) that contain the abs(mT-xi) expression do form linear combination from the abs(mT-xi) expression. For example, in the inequality equation abs (mT -x3)<A3; the left side is a linear combination comprising abs (mT -x3). Further, the expression can be rewritten as abs (mT -x3)-A3<0 which shows again this expression does form linear combinations. [Hemami Dec., ¶25]

F. An absolute value of a linear combination is a linear combination

31. I disagree with Dr. Hemami's conclusion [Hemami Dec., ¶24] that "[a]n absolute value of a linear combination is not a linear combination." An absolute value of a linear combination can be viewed as a linear combination followed by an absolute value operator, in other words $z = | ax + by |$.

G. Claim 7 "deciding" step performs a modification to the image to be displayed

32. It is my opinion that claim 7 requires a manipulation of the video signals. A cornerstone of the '842 Patent is the manipulation of the video signal during the process of de-interlacing. Further, claim 7, as supported in the specification, recites exactly that – performing a manipulation of the video signal. This is recited in claim 7 as follows.

"deciding upon assignment of said values to said missing spatial pixels according to results of said logical operations" [e.g., '842 Patent, claim 7 and claim 14, emphasis added]

H. A physical transformation occurs during the very de-interlacing step that occurs after receiving the interlaced video signal and prior to providing the de-interlaced video signal to the display.

33. The '842 Patent indicates that a physical transformation is part of the invention by replacing missing pixels with approximating values and that this step (Step 11) occurs prior to transmission of the de-interlaced video signal. [e.g., '842 Patent, col 8, ll. 8-18]

34. Further, as shown in Figures 1-3 above, this de-interlacing occurs prior to the providing of the de-interlaced signal to the display. The missing pixel is changed during the de-interlacing process – exactly as the '842 Patent discloses [e.g., '842 Patent, col 8, ll. 8-18]. It is the assignment of values to the de-interlaced image that is the physical transformation.

I. One of ordinary skill understands how to take the output of the de-interlacing method and use it to generate a de-interlaced signal

35. The output of the de-interlacing method is a de-interlaced image, that is, the consecutive fields of odd and even lines have been carefully combined to form a single image. One of ordinary skill would understand how to convert this de-interlaced image into a de-interlaced signal. Further, the invention in the '842 Patent is a method of de-interlacing video formats prior to the generation of a de-interlaced signal. One of ordinary skill would understand that the invention of the '842 Patent is unrelated to the generation of signal. [e.g., '842 Patent, col. 1, ll. 8-10; col. 11, ll. 47-52]

J. Constants can themselves be linear combinations.

36. The '842 Patent discloses in claim 16 that constants themselves can be linear combinations such that the constants are selected from linear combinations. Again, dependent claim 16 refers to constants as being selected from a group of consisting of linear combinations.

wherein said plurality of constants is selected from the group consisting of a linear combination of a plurality of values of threshold constants, and a linear combination of a plurality of values of luminance levels of said missing pixels. [e.g., '842 Patent, claim 16, emphasis added]

37. In my opinion, and for the reasons described above, a person of ordinary skill in the art could determine which interpretation is correct by reading the '842 patent specification.

III. THE '840 PATENT

A. Brief Video Processing Technology Tutorial for the '840 Patent

38. The '840 Patent is directed to entropy processing. ['840 Patent, col. 1, ll. 15-18] Similar to the signal flow of the '842 Patent, Figure 7 illustrates a typical signal flow as disclosed in the '840 Patent.

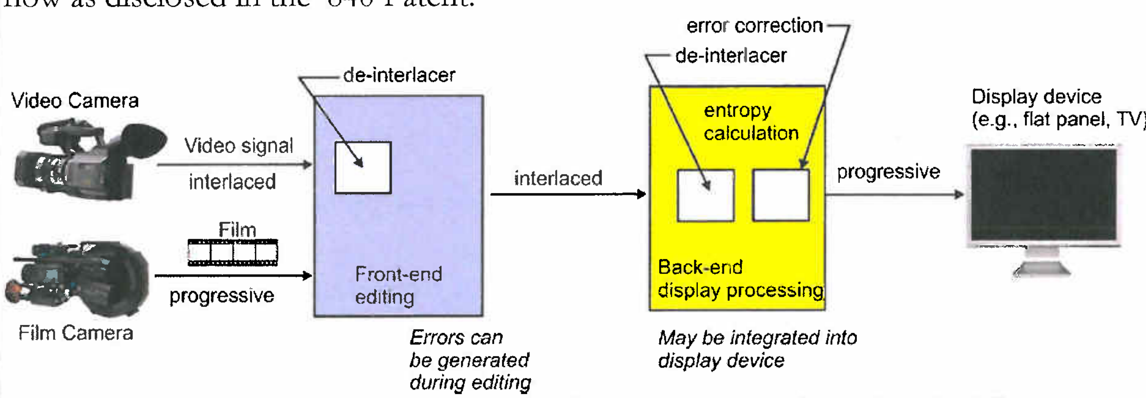

Figure 7. *Block diagram showing a typical signal flow into and out of the '840 Patent.*

39. A front-end editing station receives interlaced or non-interlaced signals, performs editing, and then can output the edited video signals in an interlaced format. The input signal may be interlaced requiring a de-interlacing operation or the progressive. The '840 Patent describes synchronization errors interjected into the video signals during the front-end editing process. In order to output an interlaced signal, the front-end can interject this error into the front-end's output interlaced video signal.

40. The back-end stage can correct the editing errors in the video signal before preparing the data for display. The '840 Patent discloses a technique for error

correction using entropy processing. This entropy processing is used to identify the origin (e.g., interlaced, non-interlaced or de-interlaced) of the input video signals and to correct these editing errors. ['840 Patent, col. 4, ll. 56-60].

41. Entropy is a measure of "degree or extent of randomness or disorder." [Joint Claim Construction and Prehearing Statement, Docket No. 90]. This is the definition of entropy as described in the specification of the '840 Patent. ['840 Patent, col. 5, ll. 19-21]. The '840 Patent discloses error correction by determining a relative measure of entropy in order to "best" approximate missing data. Figure 8a, b and c illustrates three neighborhoods of pixels with differing amounts of entropy. Figure 8d, e, and f illustrate three estimates for the missing pixel of Figure 8c resulting in a higher, medium and lesser entropy neighborhood.

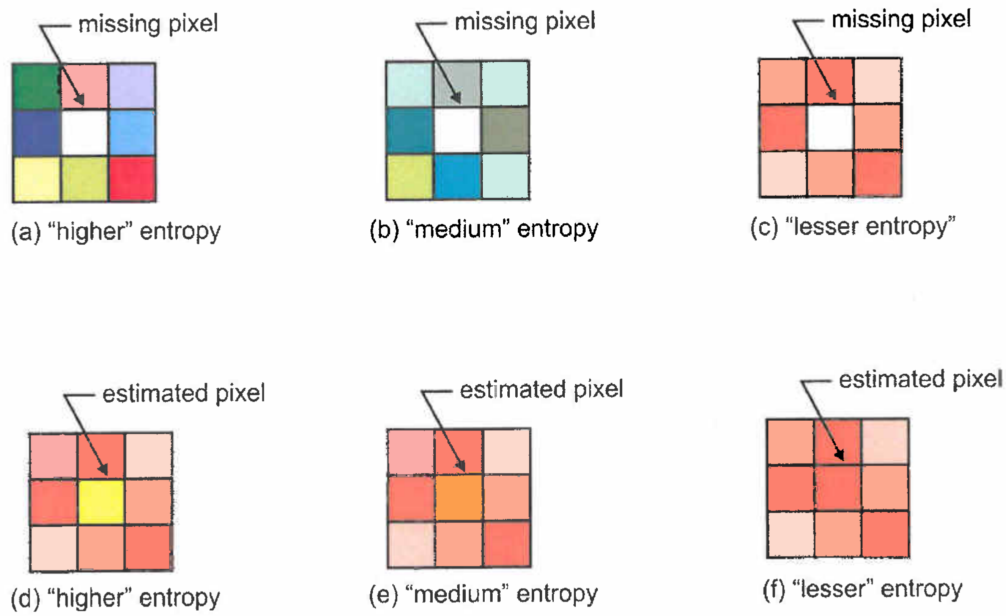

Figure 8. *Filling in a missing (virtual) pixel within a local neighborhood containing a missing pixel. (a) a higher entropy window; (b) a medium entropy window; (c) a lesser entropy window; (d) an estimated pixel causing a higher entropy for the neighborhood; (e) an estimated pixel causing a medium entropy for the neighborhood; (f) an estimated pixel causing a lesser entropy for the neighborhood;*

B. A clear interpretation of the asserted claims of the '840 patent

42. For the reasons stated below, upon analysis of the '840 Patent, I find that there is a clear and unambiguous interpretation of the asserted claims. I find that these claims clearly define the scope of the invention. I find the claim terms in question are comprehensible and explainable to one of ordinary skill.

C. Calculating individual pixel entropies

43. The determination of the entropy of a virtual pixel is actually the determination of the entropy for a population of pixels involving a plurality of local pixels in the same field or tracking a pixel or pixels through previous or future fields.

44. One of ordinary skill understands pixel entropies can be calculated in a number of different ways. Further, one of ordinary skill would not conclude that the use of the term entropy in, for example, claim 56, would be limited to an expression of entropy put forward by Claude Shannon [e.g., Hemami Declaration, ¶30].

$$H(x) = -\sum_{i=1}^{M} P(a_i)\log P(a_i)$$

45. I see no support in the '840 Patent specification or claims that would lead one of ordinary skill to conclude that Shannon's definition should be imported into the interpretation of the word "entropy" in the asserted claims given that this equation (a) is never mentioned in the '840 Patent; (b) is related to a specific field of information theory; and (c) both parties have an agreed upon construction for entropy: "the "degree or extent of randomness or disorder". In my opinion, this Shannon equation is tangential at best to the "degree or extent of randomness or disorder" calculation as disclosed in the '842 Patent. Dr. Hemami bases a number of conclusions [Hemami declaration, ¶¶30-36] regarding individual pixel entropies on the faulty supposition that the term "entropy" in the asserted claims should be limited to Shannon's entropy equation. I therefore I find no need to determine the accuracy of these derivative conclusions.

D. Entropy of a single pixel can be meaningful

46. The entropy for a single pixel can be meaningful. For example, if one can estimate the probability distribution of pixel values, one can compute how much each individual pixel contributes to the entropy of the population (e.g., selected neighborhood of pixels).

47. This is illustrated in Shannon's equation where, in essence, the entropy of a neighborhood of pixels is the summation of the entropy that each pixel contributes. This probability of a given pixel value is the total number of pixels that have that value divided by the total number of pixels in that neighborhood. Thus, one knows how much each pixel contributes to the entropy of the neighborhood. Thus, if one can estimate probabilities, one can compute how much each individual pixel contributes to entropy of the neighborhood. This is illustrated in the equations below.

E. Method for determining entropy is disclosed in the '840 Patent

48. If one understands the term entropy as recited in the claims and as disclosed in the specification ['840, col. 5 ll. 19-21] to mean "degree or extent of randomness or disorder", as agreed upon by both parties, then the analysis performed by Dr. Hemami is largely unrelated the actual claims at issue. Dr. Hemami appears to base her conclusions on this specific Shannon entropy definition and not on "degree or extent of randomness or disorder." Dr. Hemami picked a specific formula and then concludes that the '840 Patent does not disclose how to determine the entropy of individual pixels relative to assigned and characterized local neighborhoods of neighboring pixels. The '840 Patent, however, does disclose how to determine the "degree or extent of randomness or disorder" (i.e., entropy) of individual pixels relative to assigned and characterized local neighborhoods of neighboring pixels. I find no justification for Dr. Hemami to have used this specific formula given the (a) definition provided in the specification; (b) preferred embodiment that discloses

exactly how to calculate the entropy of individual pixels relative to assigned and characterized local neighborhoods of neighboring pixels ['840 Patent, col. 5, ll. 44 - col. 6, ll. 12; col. 11, ll. 42- col. 15, ll. 62].

49. Claim 56 recites "determining the entropy ..."

> (c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels [840 Patent, claim 56]

50. This method for performing this determination of entropy is disclosed in the preferred embodiment of the '840 Patent as determining the smallest of the entropies of (a) the virtual pixel; (b) each previous pixel; and (c) each next pixel. [e.g., '840 Patent, col. 14, l. 12 - col. 15, l. 54].

F. Regional sum of inter-local neighborhood weighted distances is understandable to one of ordinary skill.

51. In my opinion, and for the reasons described above, a person of ordinary skill in the art could interpret or apply the requirement of calculating inter-local neighborhood weighted parameters or the phrase "regional sum of inter-local neighborhood weighted distances" to the accused products or prior art. A person of ordinary skill would understand weighting when applied to inter-local neighborhoods. The concept of weighting is that pixels that are close to a pixel in question (virtual pixel) should affect a decision more than pixels that are farther away. This distance might be a spatial distance to the virtual pixel in a neighborhood (e.g., four pixels away) and/or a temporal distance to the virtual pixel (e.g., two fields away).

52. Claim 56 is directed to an automated process for correcting a pixel in a streaming digital video input image signal.

> whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are <u>used for automatically deciding</u> ... thereby <u>correcting an error</u> produced during real time editing of the streaming digital video image input signal... for <u>assigning a real value</u> to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal ['840 claim 56, emphasis added]

53. Claim 56 automatically determines a value for the corrected pixel using sequences of logical operations upon the calculated entropy of the virtual pixel, previous pixel in the previous field and next pixel in the next field. This automatic determination is described in the preamble as "automatically correcting an error. A typical editing error is disclosed in the specification as a synchronization error, for example, an odd field immediately following a second odd field (as opposed to the correct sequence of even-odd-even). [e.g., '840 Patent, col. 16, ll. 13-24] When such an error is detected, the determination of the corrected pixels should not be based on pixel values from the previous or next fields otherwise the error would propagate into the output. In other words, this claim does not use values from the pixels in the previous or next fields for assigning a correct (real) value to the virtual pixel.

> by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal ['840 claim 56, emphasis added]

54. In my opinion, and for the reasons described above, a person of ordinary skill in the art could understand the meaning of all of the sub-steps within step (c) and specifically, could understand (c)(iv) of claim 56, based on the teachings of the '840 Patent and the knowledge of artisans of ordinary skill in the art at the time the application for the '840 Patent was filed.

I declare under penalty of perjury of the United States of America that the foregoing is true and correct.

Executed on this 4th day of February, 2013 at Arroyo Grande, CA.

Richard J Ferraro

Richard Ferraro

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on February 4, 2013 the foregoing

DECLARATION OF RICHARD FERRARO IN SUPPORT OF PLAINTIFF'S RESPONSE TO DEFENDANT'S MOTION FOR SUMMARY JUDGMENT OF INVALIDITY

was filed with the Clerk of Court using the CM/ECF system, which will then send a notification of such filing to the following counsel of record:

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Link: 101

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES LTD., Plaintiff, v. SEARS HOLDING CORPORATION; VIZIO, INC., Defendants.	Case No. 12-cv-5707-MRP **Order Denying Vizio, Inc.'s Motion for Summary Judgment of Invalidity of U.S. Patents Nos. 6,239,842 and 7,271,840 Under 35 U.S.C. §§ 101 and 112, ¶ 2**

I. Introduction

Plaintiff Oplus Technologies Ltd. ("Oplus") has sued Defendant Vizio, Inc. ("Vizio") for patent infringement. Vizio moves for summary judgment of invalidity of each asserted claim of U.S. Patent Nos. 6,239,842 (the "'842 Patent") and 7,271,840 (the "'840 Patent"). The Court denies Vizio's motion of invalidity on grounds of 35 U.S.C. § 101 and § 112, ¶ 2 for both patents.

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II. Legal Principles

A. Summary Judgment

The Court should grant summary judgment if: (1) the movant shows that there is no genuine dispute as to any material fact; and (2) the movant is entitled to judgment as a matter of law. FED.R.CIV.P. 56(c); *see Celotex Corp. v. Catrett*, 477 U.S. 317, 322 (1986); *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242 (1986). The Court must: (1) identify material facts by reference to the governing substantive law, *Anderson*, 477 U.S. at 248; (2) disregard irrelevant or unnecessary factual disputes, id.; and (3) view facts and draw reasonable inferences in favor of the nonmoving party, *Scott v. Harris*, 550 U.S. 372 (2007).

The Court cannot grant summary judgment if the dispute concerning a material fact is such that a reasonable jury could return a verdict for the nonmoving party. Id. Faced with a properly supported summary judgment motion, the nonmoving party may not rest upon mere allegations or denials of its pleading but must set forth specific facts showing a genuine issue for trial. Id. "Where the record taken as a whole could not lead a rational trier of fact to find for the nonmoving party, there is no genuine issue for trial." *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 587 (1986).

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B. Indefiniteness (35 U.S.C. § 112)

"The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." 35 U.S.C. § 112, ¶ 2 . "[A] claim is indefinite only if the 'claim is insolubly ambiguous, and no narrowing construction can properly be adopted.'" *Honeywell Int'l, Inc. v. United States*, 609 F.3d 1292, 1301 (Fed. Cir. 2010) (citation omitted). "If the meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds." *Id.* (citation omitted). "Nevertheless, '[e]ven if a claim term's definition can be reduced to words, the claim is still indefinite if a person of ordinary skill in the art cannot translate the definition into meaningfully precise claim scope.'" *Id.* (citing *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1251 (Fed.Cir.2008)).

C. Patent-Eligible Subject Matter (35 U.S.C. § 101)

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. § 101. "'[L]aws of nature, natural phenomena, and abstract ideas' are not patentable." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*,

132 S.Ct. 1289, 1298 (2012). "[A]ll inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas . . . [A] process is not unpatentable simply because it contains a law of nature or a mathematical algorithm." *Id.* at 1293 (citation omitted). "[A]n *application* of a . . . mathematical formula to a known structure or process may well be deserving of patent protection." *Id.* at 1293-94.

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III. Technical Background

A. '842 patent

At the highest level of abstraction, the '842 patent covers technology for modifying video signals. Video signals are sometimes formatted in an interlaced manner, with successive fields containing pixel values in alternating (odd and even) rows. As Figure 3 shows, the technology interpolates the missing value for pixel 'P' by using available values of other pixels (x1, x2, . . . x6) in the same field (Y_t) and also pixels (g1, g2, . . . g6) in neighboring fields (Y_{t-1}, Y_{t+1}).

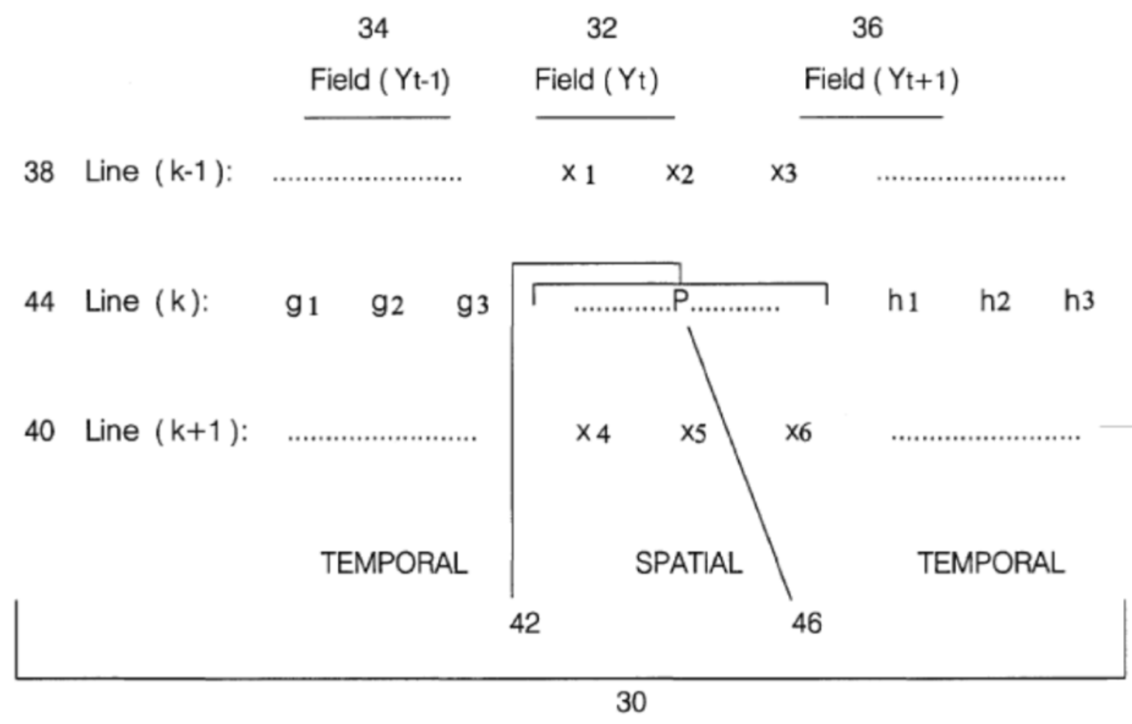

Fig.3

Claim 7, for example, is a method of de-interlacing an interlaced video which includes several steps: (a) receiving the video; (b) analyzing the available information of pixels with known values near the pixel being approximated; and (c) deciding values to assign to pixels being approximated. The analysis step involves determining a variety of relationships between linear combinations of several parameters. These parameters include known values of spatial/temporal pixels, their averages, standard deviations, minimum standard deviations, absolute values of differences between temporal pixel averages and spatial pixel averages, and other constants.

B. ‘840 patent

The ‘840 patent is about a method of determining pixel entropy, a statistic useful for identifying the origin of video and for correcting errors during editing of streaming video signals. Entropy is the extent or degree of randomness or disorder in a system. A pixel’s entropy captures how much activity is happening surrounding it. For a picture of a chessboard, for example, the entropy in the center of each square (black or white) will be low. But pixels lying on the actual lines of the chessboard separating the squares will demonstrate high entropy.

Pixel entropy can be applied to achieve useful ends. The two applications that the ‘840 specification mentions are signal source detection and error correction. Signal source detection simply means figuring out the type of camera which

produced an image. The usefulness of such technology is self-evident. The claims relevant to this motion do not recite signal source detection. The other application, the one the asserted claims do recite, is error correction. Errors during video editing can result in non-consecutive fields getting lumped together in a video sequence. In such a scenario, interpolating a missing pixel using only information from a previous field is undesirable for obvious reasons. Here, entropy techniques can be deployed to avoid using this wrong data for interpolation.

Claim 56, a representative claim, involves a method of determining entropy for automatic error correction. It contains the following steps: (a) receiving video signals, (b) assigning local neighborhoods for each input pixel in a sequence of three consecutive temporal fields, (c) determining the entropy of each pixel in the three fields. The final step involves calculating pixel parameters, adjusting entropy counters, and ultimately calculating entropy values. The claim also recites that these entropy values are used for automatic error correction.

IV. Discussion

In its motion, Vizio has advanced two defenses to each patent: (1) the '842 asserted claims are indefinite under 35 U.S.C. § 112, ¶2; (2) the '842 asserted claims are not directed to eligible subject matter under 35 U.S.C. § 101; (3) the '840 asserted claims are indefinite under 35 U.S.C. § 112, ¶2; and (4) the '840

asserted claims are not directed to eligible subject matter under 35 U.S.C. § 101. The Court addresses each in turn:

A. The asserted claims of the ‘842 patent are not indefinite under 35 U.S.C. § 112, ¶ 2.

Claim 7 of the ‘842 patent recites:

> A method for de-interlacing an interlaced video format, the method comprising the steps of:
>
> (a) receiving the interlaced video format feature a sequence of fields of pixels to be de-interlaced;
>
> (b) ***evaluating logical operations*** of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, ‘and,’ ‘or,’ and ‘xor;’ and
>
> (c) deciding upon assignment of values to missing spatial pixels according to results of said logical operations.

‘842 at 12:62-13:15 (Claim 7).

Vizio argues that the “evaluating logical operations” step (bolded above) is indefinite because one skilled in the art could not determine: (1) whether to perform logical operations on the *values* or on *linear combinations formed from the values*; and (2) whether the “plurality of constants” is within or without the

Markush group. The Court rejects both arguments on the ground that to the extent these claim terms are ambiguous, they are not insolubly so. In fact, the intrinsic evidence by itself establishes the claim terms in question are sufficiently clear to avoid invalidity on indefiniteness grounds. Consequently, the expert testimony of Dr. Sheila S. Hemami on behalf of Vizio is irrelevant to the analysis. "When an analysis of intrinsic evidence resolves any ambiguity in a disputed claim term, it is improper to rely on extrinsic evidence to contradict the meaning so ascertained." *Intel Corp. v. VIA Technologies, Inc.*, 319 F.3d 1357, 1367 (Fed. Cir. 2003) (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed.Cir.1996)).

1. Claim 7 requires evaluating logical operations on "linear combinations" of "values selected from a group of values."

The actual words of Claim 7 are: "evaluating logical operations of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels . . . ."

Vizio argues that an artisan could interpret the above words as covering: "evaluating logical operations of ~~linear combinations of values selected from~~ the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels . . . ." Mot. at 15 ("[L]imitations of claim 7 . . . *could* be read to mean that "logical operations" are evaluated on "the group consisting of . . . ."). Vizio's

interpretation is unpersuasive because by disregarding the effect of actual claim limitations, it contradicts "the well-established rule that 'claims are interpreted with an eye toward giving effect to all terms in the claim.'" *Digital-Vending Servs. Int'l, LLC v. Univ. of Phoenix, Inc.*, 672 F.3d 1270, 1275 (Fed. Cir. 2012) (citation omitted). Vizio also notes the fact that certain group members are not themselves linear combinations, whereas other group members are. The claim language, however, does not concern itself with whether individual group members *themselves* are linear combinations. It plainly recites "linear combinations ***of*** values selected from the group," i.e., combining, in a linear manner, values selected from the group. This step is agnostic to whether the terms being combined are themselves linear combinations or not.

Again, Claim 7 requires "evaluating logical operations of linear combinations of values selected from a group." The group consists of the following members: (1) standard deviation (Sigma); (2) minimum standard deviation (Min-Sigma); (3) averages of known values of spatial pixels; (4) averages of known values of temporal pixels; (5) absolute values of differences between said averages of known values of temporal and spatial pixels; (6) known values of spatial pixels; and (7) a plurality of constants. Consequently, the claim requires evaluating logical operations of linear combinations of values selected from among the above seven terms.

To support its questionable interpretation, Vizio cites steps (iii) to (viii) of Fig. 5/2, Step 10(b) – an embodiment describing the "evaluating logical operations step," reproduced and highlighted below. *Id.*

(10) <u>Decide from potential values to the missing spatial pixel, and assign a value to the missing spatial pixel.</u>

(a) evaluate logical operations of linear combinations of averages, standard deviations, minimum standard deviations, absolute values of differences between average values of pixels and known values of pixels, and known values of pixels, with previously defined threshold constants, and pixel luminance levels.

(b) assign the value of the correct decision to the missing spatial pixel.

- If (i) Sigma <= (K0 + Min-Sigma), where $-C_0 <= K0 < C_0$, or
  (ii) Min-Sigma >= (W - K1), where $-C_1 <= K1 < C_1$, or
  (iii) abs $(m_T - x_1)$ < A1, or (iv) abs $(m_T - x_2)$ < A2, or
  (v) abs $(m_T - x_3)$ < A3, or (vi) abs $(m_T - x_4)$ < A4, or
  (vii) abs $(m_T - x_5)$ < A5, or (viii) abs $(m_T - x_6)$ < A6, or
  (ix) $m_T <= (B + K2)$, where $-C_2 <= K2 < C_2$, or
  (x) [(Previous-Result) - n_T <= A6] and [m_T >= W - A7], then:
  - If Sigma < A8, value of the missing spatial pixel (**P 46** in Fig. 3) is assigned as: **P** = $(m_T + m_j)$ * K3, where 0 < K3 < 1.
  - If Sigma >= A8, value of the missing spatial pixel (**P 46** in Fig. 3) is assigned as: **P** = m_T.
- If none of (i) through (x) is correct, then value of missing spatial pixel (**P 46** in Fig. 3) is assigned as: **P** = m_j.

Vizio highlights these six logical operations as involving stand-alone variables such as "abs $(m_T – x_1)$" "***without first forming a linear combination***." Mot. at 15 (emphasis added). The bolded portion is wrong and is based on a mischaracterization of linear combinations. The Court therefore discusses the general idea of linear combinations of variables to explain why each of the logical operations highlighted above *is* by itself a linear combination of values selected from among the Markush group of seven values. To be clear, the Court is not

concerned with whether abs ($m_T - x_1$) is *itself* a linear combination or not. It is answering, in the affirmative, that "abs ($m_T - x_1$) < A1" is a linear combination of values selected from the Markush group of seven values (listed above). Critically, the Court's conclusion is unchanged even if A1 is not considered a member of the Markush group. In other words, even the expression "abs ($m_T - x_1$) < 0" is a logical operation of a linear combination of values selected from the Markush group.

Consider the following set of terms: variables 'x,' 'y,'coefficients 'a,' 'b,' and a constant 'c.' A linear combination of these terms assumes the form "ax + by + c." A logical operation, as defined by the '842 patent, includes any member of the group: greater than ('>'), less than ('<'), greater than or equal to ('>='), less than or equal to ('<='), 'and,' 'or,' and 'xor.' '842 at col. 13 II. 10-13. A logical operation of a linear combination of the above terms, therefore, assumes the general form:

[Left-Hand-Side Term ("LHS")] ___ [Right-Hand Side Term ("RHS"]

In the above equation form, the LHS and RHS terms are *logically compared* by one of the listed logical operations. For example, "ax + by +c < 0" or "ax +by + c >= 0" are logical operations of linear combinations of these terms. Terms can be displaced from the right hand side of the equation to the left hand side, and vice versa, without affecting the status of the logical operation as one involving a linear combination. For example, the below terms are equivalent. They are all logical operations of linear combinations where 'a' = 1, 'b' = 3, and 'c' = 5:

$x + 3y + 5 < 0$ (matches the traditional form of $ax + by + c < 0$)

$x + 3y < -5$

$x + 5 < -3y$

$3y + 5 < -x$

The coefficients (a and b) can assume any scalar value. Critically, 'a' or 'b' could even be zero. Consequently, assume 'a' = 1, 'b' = 0, and 'c' = 0. This yields the stand-alone LHS term '$x < 0$.' This is as much a logical operation of a linear combination of the above terms as '$x + 3y + 5 < 0$.' The below terms are all equivalent to '$x < 0$' and demonstrate why '$x < 0$' is a logical operation of a linear combination:

$ax + by + c < 0$, where 'a' = 1, 'b' = 0, 'c' = 0

$(1)x + (0)y + (0) < 0$

$(1)x < -(0)y - (0)$

Returning to the term in the '842 patent specification, the Court finds that "abs $(m_T – x_1) < A1$" *is* a logical operation of a linear combination because it is equivalent to the below:

(0 x Sigma) + (0 x Sigma-Min) + (1 x abs($m_T – x_1$)) + (0 x abs($m_T – x_2$)) + (0 x abs($m_T – x_3$)) + (0 x abs($m_T – x_4$)) + (0 x abs($m_T – x_5$)) (0 x abs($m_T – x_6$)) + (0 x m_T) + (0 x Previous-Result – n_T) – (1 x A1) < 0

The above long-form version is *identical* in substance to the disclosed logical operation "abs ($m_T - x_1$) < A1." The Court finds, therefore, that the "evaluating logical operations" step is not indefinite.

2. The "plurality of constants" is not a mandatory value outside the Markush group and is clearly part of the Markush group.

Step (b) of Claim 7 recites:

> ***evaluating logical operations*** of linear combinations of values selected ***from the group consisting of***
> - averages of known values of spatial pixels,
> - averages of said known values of temporal pixels,
> - standard deviations of said known values of said spatial pixels,
> - standard deviations of said known values of said temporal pixels,
> - minimums of said standard deviations of said known values of said spatial pixels,
> - absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels,
> - said known values of said spatial pixels, ***and***
> - a plurality of constants,
>
> said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and,' 'or,' and 'xor;'

The plain language of this claim shows that the "plurality of constants" term appears at the end of a list of group members. The word "and" confirms this. Vizio provides three pieces of evidence in the intrinsic record, all of which purportedly indicate that the 'plurality of constants" term is not just an optional member of the Markush group but is an out-of-group *required* variable in the logical operation: (1) a specification embodiment describes "logical operations ***of*** linear

combinations of averages, standard deviations . . . and known values of pixels, ***with*** previously defined threshold constants, and pixel luminance levels," Koole Decl., ¶2, Exh. A, '842 Patent at FIG. 5/2; (2) each logical operation depicted in Step 10(b) of Fig. 5/2 involves a constant; and (3) a specification excerpt describes "comparisons . . . ***to*** linear combinations of threshold constants (A1 through A8) or pixel luminance levels (B,W)." Mot. at 16-17.

Vizio fails to show clear and convincing evidence of insoluble ambiguity in the claim language for two reasons. *First*, the singular embodiment depicted in Fig. 5/2 and described at length in the specification, numerous excerpts of which Vizio cites, lacks a clear, unmistakable, and unambiguous disavowal of claim scope. In fact, the patentee stated immediately after describing the embodiment, "While the invention has been described with respect to one embodiment, it will be appreciated that ***many variations, modifications and other applications of the invention may be made***." '842 at 12:4-8 (emphasis added). *Second*, "even where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words of expressions of manifest exclusion or restriction." *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011). The plain and ordinary meaning of the claim language of Claim 7 makes it clear that the

"plurality of constants" is not a required element *outside* the Markush group but is one element of the Markush group itself.

As such, "an algorithm that evaluated logical operations on linear combinations of known values of spatial pixels would fall within the scope of the claim even if the logical operations did *not* involve comparisons to a plurality of constants." Mot. at 17. Vizio's characterization, indeed its criticism, of the specification as *inconsistent* and *irreconcilable* with the standard Markush group interpretation, is based on the patentee's failure to illustrate a logical operation *not* involving the "plurality of constants" term. But the patentee is not required to disclose every permutation and combination of her invention. Without evidence of an intentional disavowal or disclaimer in the intrinsic record or a special definition, the Court cannot displace the "plurality of constants" from the Markush group.

Vizio has failed to establish that any claim terms in the '842 patent are insolubly ambiguous. The Court, therefore, rejects Vizio's motion for summary judgment that the '842 patent is invalid under 35 U.S.C. § 112, ¶2.

B. The asserted claims of the '842 patent are directed to patentable subject matter under 35 U.S.C. § 101.

Before analyzing the eligibility of the claims of the '842 patent, the Court first examines a recent relevant Federal Circuit opinion – *Research Corp. Technologies*

v. Microsoft Corp., 627 F.3d 859 (Fed. Cir. 2010).[1] RCT had six patents relating to "digital image halftoning." *Id.* at 862.

> Digital images often show shades of gray and even a spectrum of colors. Nonetheless, computer displays and printers can only use a limited number of primary colors to display these digital images. Halftoning bridges this gap by simulating a continuous tone image through the use of dots. Halftoning techniques allow computers to present many shades and color tones with a limited number of pixel colors.

Id. at 863.

> One method of generating a digital halftoned image is called "thresholding." The thresholding technique uses a ***two-dimensional array called a "mask"*** that is populated with predetermined threshold numbers, which are typically between 1 and 256. The thresholds do not relate at all to the image to be halftoned. The thresholding technique compares the gray level at each pixel of the image against the threshold that corresponds to the pixel's position. If the gray level exceeds the corresponding threshold, the pixel is turned on, i.e., the computer places a "1" in the appropriate memory space. The resulting halftone image is a two-dimensional array of zeros and ones.

Id. at 863 (emphasis added).

The inventors of the RCT patents devised a special mask (see bolded portion above), "which was stored in a computer's memory, to carry out a ***pixel-by-pixel comparison*** of the mask to the digital image." *Id.* at 864. "Their halftoning technique compare[d] the gray level of each pixel in a digital image to the corresponding threshold number in the blue noise mask to produce a halftone image." *Id.*

[1] Hereinafter, the Court will refer to this case as "*RCT*," or, when referencing the plaintiff in that case, "RCT."

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The asserted claims recited:

> A method for the halftoning of gray scale images by utilizing a pixel-by-pixel comparison of the image against a blue noise mask in which the blue noise mask is comprised of a random non-deterministic, non-white noise single valued function which is designed to produce visually pleasing dot profiles when thresholded at any level of said gray scale images.′310 patent col.10 ll.23-30 (Claim 1).
>
> The method of claim 1, wherein said blue noise mask is used to halftone a color image. *Id.* col.10 ll.31-32 (Claim 2).

Id. at 865.

The Federal Circuit held that these claims were directed to patent-eligible subject matter, which they characterized as "only a threshold test." *Id.* at 868 (citing *Bilski v. Kappos*, 130 S.Ct. 3218, 3225 (2010)). Noting first that the patent claims were directed to a "process," the Federal Circuit preliminarily held that the claims "qualifie[d] under both the categorical language of section 101 and the process definition in section 100." *RCT* at 868. Next, the court refrained from defining an abstract idea and stated that the disqualifying characteristic of abstractness "should exhibit itself so manifestly as to override the broad statutory categories of eligible subject matter and the statutory context that directs primary attention on the patentability criteria of the rest of the Patent Act." *Id.* In that context, the Federal Circuit perceived "nothing abstract in the subject matter of the processes . . . for rendering a halftone image of a digital image by comparing, pixel by pixel, the digital image against a blue noise mask." *Id.*

One paragraph in the *RCT* opinion captures the essence of the Court's reasoning that RCT's asserted pixel-by-pixel image processing claims were not directed to an abstract idea:

> The invention presents functional and palpable applications in the field of computer technology. These inventions address "a need in the art for a method of and apparatus for the halftone rendering of gray scale images in which a digital data processor is utilized in a simple and precise manner to accomplish the halftone rendering." ′310 patent col.3 ll.33-40. The fact that some claims in the ′310 and ′228 patents require a "high contrast film," "a film printer," "a memory," and "printer and display devices" also confirm this court's holding that the invention is not abstract. Indeed, this court notes that inventions with specific applications or improvements to technologies in the marketplace are not likely to be so abstract that they override the statutory language and framework of the Patent Act.

Id. at 868-69.

The Federal Circuit's rationale in the above paragraph clarifies that the task of the Court is to place an analyzed claim in one of two categories: abstract ideas versus application-specific implementations of abstract ideas. Patent law renders the former ineligible and the latter eligible. Indeed, patent law incentivizes innovation surrounding the latter assuming it meets the other criteria of patent validity, e.g., novelty, enablement, etc.

Mathematical algorithms are abstract ideas. Application-specific implementations of mathematical algorithms are not, assuming they are not mere post solution activity. Indeed, "[t]o transform an unpatentable [abstract idea] into patent-eligible application of such [abstract idea], one must do more than simply

state the [abstract idea] while adding the words 'apply it.'" *Mayo* at 1294. "Einstein, we assume, could not have patented his famous law by claiming a process consisting of simply telling linear accelerator operators to refer to the law to determine how much energy an amount of mass has produced (or vice versa). Nor could Archimedes have secured a patent for his famous principle of flotation by claiming a process consisting of simply telling boat builders to refer to that principle in order to determine whether an object will float." *Id.* at 1297.

In *RCT*, the Federal Circuit stated that the halftoning "algorithms and formulas, even though admittedly a significant part of the claimed combination, do not bring this invention even close to abstractness that would override the statutory categories and context." 627 F.3d at 869. The court cited the Supreme Court as having made abundantly clear that inventions incorporating and relying upon even "a well-known mathematical equation do not lose eligibility because 'several steps of the process [use that] mathematical equation.'" *Id.* (citing *Diamond v. Diehr*, 450 U.S. 175, 185 (1981)). The Federal Circuit further noted (1) the impropriety of dissecting claims into old and new elements and then to ignore the old elements in the analysis, as well as (2) then necessity of considering the claims as a whole in determining their eligibility under section 101. *Id.* (citing *Diehr*, 450 U.S. at 185).

The Federal Circuit perceives Section 101 as a "coarse eligibility filter." This filter allows certain patents to go through even if they are otherwise defective. The

idea is that other sections of 35 U.S.C. will *take care*, in their own way, of the so-called "bad" patents that Section 101 lets through. Section 101 is best suited, therefore, to render ineligible those patents that are so manifestly abstract that they must be dealt with on patent-eligibility grounds, lest they survive other validity challenges and usurp what rightfully belongs in the public domain. In sum, section 101 tolerates deeming certain patents "eligible" if they are not *so* manifestly abstract as to override the statutory language of section 101, but nonetheless lack sufficiently concrete disclosure to merit a patent.

For such eligible-but-bad patents (or pollutants under the coarse-filter metaphor) the Federal Circuit notes the availability of section 112 as a "powerful tool[] to *weed out* claims that may present a vague or indefinite disclosure of the invention." *Id.* at 869 (emphasis added). "Thus, a patent that presents a process sufficient to pass the coarse eligibility filter may nonetheless be invalid as indefinite because the invention would 'not provide sufficient particularity and clarity to inform skilled artisans of the bounds of the claim.'" *Id.* (citing *Star Scientific., Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357, 1371 (Fed.Cir.2008)). "That same subject matter might also be so conceptual that the written description does not enable a person of ordinary skill in the art to replicate the process." *Id.* This idea of letting not-manifestly-abstract-yet-lacking-in-sufficient-disclosure patents survive section 101, and instead analyzing them under

section 112, has attracted recent academic attention. *See* Dennis Crouch & Robert P. Merges, *Operating Efficiently Post-Bilski by Ordering Patent-Doctrine Decision-Making*, 25 BERKELEY TECH. L.J. 1673 (2010) (discussing a chronological order of patent validity analysis deferring section 101 as a last possible resort).[2]

Also, Section 101 has not generated an extensive body of case law and is thus less firm and more controversial a ground on which to invalidate a patent. As such, where a claim at issue is factually similar to a claim which the Federal Circuit recently found eligible, e.g., the RCT claim, the Court has ample reason to exercise caution in applying section 101. This approach to decisionmaking is not unique to patent law, as Merges and Crouch point out, and traces back to avoidance – a preeminent canon of federal statutory construction. The authors further note:

> Validity under § 101 presents issues to the courts that are complex, difficult, and saturated by fundamental policy considerations. Deciding a § 101 case necessarily involves a judgment about whether a particular invention falls into a particular category of inventions—and ultimately about the patentability of that category as a whole. This is an issue that often far transcends the inherently bounded questions of patentability under §§ 102 and 103, or enablement under § 112. The courts in this area are given rather thin material to work with: some fairly ancient general phrases (machine, manufacture, composition of matter), and some quite general categories of exception (products of nature, natural phenomena, abstract ideas). To fashion a holding in a § 101 case out of these materials will often require a court to stretch the available authority in an effort to apply it to specific facts. It is therefore to be expected that rulings in these

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[2] *See also* Robert P. Merges, *Selected Thoughts on a Myriad of Problems*, available at http://www.scotusblog.com/2013/02/selected-thoughts-on-a-myriad-of-problems/ (last accessed on February 17, 2013) (noting how the Court-created exceptions of law of nature, natural phenomena, and abstract ideas are difficult to pin down with clear verbal formulations and create a prime breeding ground for metaphysical speculation).

> cases will often engender controversy and strain the credibility of the courts in charge. Therefore, the same logic that leads the Supreme Court to avoid its most delicate subject matter ought to apply in the case of patents and § 101.

Crouch & Merges at 1683.

With all of the above as background, the Court analyzes the claims of the '842 under section 101. Motivated primarily by the similarity of the '842 claims to the *RCT* claims (which the Federal Circuit found eligible), the Court finds that the '842 claims are directed to patent eligible subject matter.

Claim 7 of the '842 patent is representative and is reproduced below:

> A method for de-interlacing an interlaced video format, the method comprising the steps of:
>
> (a) ***receiving*** the interlaced video format feature a sequence of fields of ***pixels to be de-interlaced***;
>
> (b) ***evaluating logical operations*** of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and,' 'or,' and 'xor;' and
>
> (c) deciding upon ***assignment of values to missing spatial pixels*** according to results of said logical operations.

'842 at 12:62-13:15 (Claim 7).

Claim 7 is analogous to the claim in *RCT*, reproduced below:

> A method for the halftoning of gray scale images by utilizing a pixel-by-pixel comparison of the image against a blue noise mask in which the blue noise mask is comprised of a random non-deterministic, non-white noise single valued function which is designed to produce visually pleasing dot profiles when thresholded at any level of said gray scale images.

RCT, 627 F.3d at 865 (citing ′310 patent col.10 ll.23-30).

Both claims recite methods of processing an image on a pixel-by-pixel basis. For example, the algorithm disclosed in step (b) of Claim 7 of the '842 patent operates on the image on a pixel-by-pixel basis for each missing pixel. Likewise, the algorithm in the RCT patent involves application of the blue noise mask to an image on a pixel-by-pixel basis. Both the '842 patent and the *RCT* patents are "functional and palpable applications in the field of computer technology." *RCT*, 627 F.3d at 868. Although algorithms in both the '842 patent and in RCT's '310 patent are "admittedly a significant part of the claimed combination, [they] do not bring [the claimed invention] even close to abstractness." *Id.* at 869.

The Federal Circuit in RCT noted that "some claims" in the '310 patent require a "high contrast film," "a film printer," "a memory," and "printer and display devices," as "confirmation" of the court's holding that the halftoning invention was not abstract. *Id.* Vizio states, "Nothing in the '842 Patent suggests that the 'receiving' step involves any machinery or specific hardware or describes any mechanism by which an interlaced video signal would actually be altered to include values assigned to missing pixels." But the absence of a machine is no

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longer dispositive for section 101 analysis. *Bilski*, 130 S.Ct. at 3227 ("This Court's precedents establish that the machine-or-transformation test is a useful and important clue . . . [but] not the sole test for deciding whether an invention is a patent-eligible process.").

Next, Vizio distinguishes Claim 7 of the '842 from the patent-eligible claim in *Diehr* and analogizes Claim 7 to the patent-ineligible claim in *Flook*. Vizio cites the Supreme Court's recent opinion in *Mayo* as concluding that "the key difference between *Diehr* and *Flook* was that the *Diehr* claims required physical steps and changes to the claimed rubber-making process based on the recited algorithm, while the Flook clams did not require physical steps or changes to the related process." Mot. at 21-22 (citing *Mayo*, 132 S.Ct. at 1298-99).

A closer review of the Supreme Court's opinion in *Mayo* reveals that Vizio's analysis of Claim 7, analogizing it to *Flook* and distinguishing it from *Diehr*, is incomplete. Discussing *Diehr*, the Supreme Court in *Mayo* stated:

> The Diehr process (held patent eligible) set forth a method for molding raw, uncured rubber into various cured, molded products. The process used a known mathematical equation, the Arrhenius equation, to determine when (depending upon the temperature inside the mold, the time the rubber had been in the mold, and the thickness of the rubber) to open the press. It consisted in effect of the steps of: (1) continuously monitoring the temperature on the inside of the mold, (2) feeding the resulting numbers into a computer, which would use the Arrhenius equation to continuously recalculate the mold-opening time, and (3) configuring the computer so that at the appropriate moment it would signal "a device" to open the press.

> The Court pointed out that the basic mathematical equation, like a law of nature, was not patentable. But it found the overall process patent eligible because of ***the way the additional steps of the process integrated the equation into the process as a whole***. Those steps included "installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time." *Id.*, at 187, 101 S.Ct. 1048. It nowhere suggested that all these steps, or at least the combination of those steps, were in context obvious, already in use, or purely conventional. And so the patentees did not "seek to pre-empt the use of [the] equation," but sought "only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process." Ibid. These other steps apparently ***added to the formula something that in terms of patent law's objectives had significance—they transformed the process into an inventive application of the formula***.
>
> *Mayo*, 132 S. Ct. at 1298-99 (emphasis added).

The Supreme Court then distinguished *Flook* from *Diehr*:

> The process in Flook (held not patentable) provided a method for adjusting "alarm limits" in the catalytic conversion of hydrocarbons. Certain operating conditions (such as temperature, pressure, and flow rates), which are continuously monitored during the conversion process, signal inefficiency or danger when they exceed certain "alarm limits." The claimed process amounted to an improved system for updating those alarm limits through the steps of: (1) measuring the current level of the variable, e.g., the temperature; (2) using an apparently novel mathematical algorithm to calculate the current alarm limits; and (3) adjusting the system to reflect the new alarm-limit values. 437 U.S., at 585–587, 98 S.Ct. 2522.
>
> The Court, as in Diehr, pointed out that the basic mathematical equation, like a law of nature, was not patentable. But it characterized the claimed process as doing ***nothing other than*** "provid[ing] a[n unpatentable] formula for computing an updated alarm limit." Flook, *supra*, at 586, 98 S.Ct. 2522. Unlike the process in Diehr, it ***did not "explain how the variables used in the formula were to be selected, nor did the [claim] contain any disclosure relating to chemical processes at work or the means of setting off an alarm or adjusting the alarm limit***." Diehr, supra, at 192, n. 14, 101 S.Ct. 1048;

> see also Flook, 437 U.S., at 586, 98 S.Ct. 2522. And so the ***other steps in the process did not limit the claim to a particular application***. Moreover, "[t]he chemical processes involved in catalytic conversion of hydrocarbons[,] ... the practice of monitoring the chemical process variables, the use of alarm limits to trigger alarms, the notion that alarm limit values must be recomputed and readjusted, and the use of computers for 'automatic monitoring-alarming' " were all "well known," to the point where, putting the formula to the side, there was no "inventive concept" in the claimed application of the formula. Id., at 594, 98 S.Ct. 2522. "[P]ost-solution activity" that is purely "conventional or obvious," the Court wrote, "can[not] transform an unpatentable principle into a patentable process." Id., at 589, 590, 98 S.Ct. 2522.
>
> *Mayo*, 132 S. Ct. at 1299 (emphasis added).

The bolded portions in the above excerpts reveal that Vizio oversimplifies matters when it states, "The distinctions between Diehr and Flook are significant in this case because the asserted '842 and '840 Patent claims receive data, apply a mathematical algorithm to it, and end with a 'decision' based on the algorithm results. No manipulation of the video signals is actually required. Thus, Oplus' claims are unpatentable for the same reasons as the claims in Flook." Mot. at 22.

If similar analogies to *Flook* become Section 101 law, then *all software is ineligible for patent protection*. All software ***only*** "receives data," "applies algorithms," and "ends with decisions." That is the *only* thing software does. Software does nothing more. To be sure, software in certain signal processing fields such as image processing can *culminate* in the rendering of an image on a display device. But that is not the work of software. Software just takes in a series of ones and zeroes and converts them into a different series of ones and zeroes.

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RCT's patent claims did not survive an eligibility challenge because they culminated in a display of images. Likewise, the Court is not fixated on whether Claim 7 renders a display of images or whether it just generates a matrix of numbers. The distinction between an invention directed only to image processing and another invention directed to image processing followed by image display does not render the former invention ineligible but the latter eligible for patent protection. The former invention might fail the "machine or transformation test" – but that is no longer a definitive test of patent eligibility and is only an important and useful clue. *See Mayo*, 132 S.Ct. at 1296. If a culminating transformative step such as image rendering is deemed a pre-requisite for patent protection, then other software fields such as encryption, data compression, and digital rights management are likewise lacking in such a culminating transformative step. All such fields "receive data," "apply algorithms," and "end with decisions." If that were the true test for Section 101, the Court could change the landscape of patents quite dramatically.

A closer comparison between the ineligible claims in *Benson* and *Flook*, on the one hand, and the eligible claim in *Diehr*, on the other, reveals that the '842 patent is directed to eligible subject matter. In *Mayo*, the Supreme Court noted that the patent in *Flook*, unlike that in *Diehr*, did not "explain how the variables used in the formula were to be selected." Here, the '842 patent specification and Claim 7

identify the selection criteria for the input variables – they must be pixels with missing values in the empty rows of interlaced frames. The Supreme Court also noted, “nor did the [*Flook* claim] contain any disclosure relating to chemical processes at work or the means of setting off an alarm or adjusting the alarm limit.” Here, the process at work is detailed in step (b) of the claim itself, whereas step (c) is limited to deciding an assignment of values to missing spatial pixels.

The Court next addresses how *Benson* fits into this framework. In *Benson*, the Supreme Court considered whether a patent application for an algorithm to convert binary-coded decimal numerals into pure binary code was a “process” under § 101. 409 U.S., at 64–67. The Court first explained that “a principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.’” *Id.* at 67 (quoting Le Roy, 14 How., at 175, 14 L.Ed. 367). The Court then held the application at issue was not a “process,” but an unpatentable abstract idea. “It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting ... numerals to pure binary numerals were patented in this case.” 409 U.S., at 71. A contrary holding “would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.” Id., at 72, 93 S.Ct. 253. But, at the same time, the Supreme Court has recognized that “too broad an interpretation of this exclusionary principle could eviscerate patent law.” *Mayo*,

132 S.Ct. 1289, 1993 (2012). “For all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.” *Id.* at 1293.

The ‘842 patent is quintessentially an image-processing patent. One could add trivial data-gathering means like cameras on the input side of an image processing system. And one could add image-rendering devices like graphics cards and display devices on the output end of the system. But in this classic control system, sandwiched in the middle of the input signal and the output signal is an intelligent system wired (rather, programmed) to converting matrices of numbers representing pixel intensities to other numbers. On occasion, such as the ‘842 patent, the system converts an input of a matrix with *missing* pixel intensities into a matrix with assigned pixel entities via interpolation. Patent eligibility in the image processing industry is not limited to innovation in image-gathering (e.g., high definition cameras), or image-rendering (e.g., high definition display devices). Indeed, the invention often lies in the middle: the image *processing* algorithm. And all image *processing* often amounts to is, as the *RCT* invention and the ‘842 invention illustrate, converting ones to zeroes.

Benson did not wipe out patent protection for the signal processing or software industry. It only held that preempting a formula is not permissible. Here, Claim 7 does not seek to preempt any of the logical operations it recites. It is a specific

invention which takes, as an input, an image frame with missing pixels, applies logical operations to values derived from specific missing pixels and their local spatial or temporal neighborhoods, and reaches an educated guess about those missing values. It is distinguishable from *Benson* because it is not directed at the logical operators themselves, but at a specific application of interpolating missing rows in a specific digital-imaging application. And it is distinguishable from *Flook* in that it specifies how it derives its input variables, specifies the actual process being used to convert the null values of pixels in missing rows to actual values, and assigns the derived values to those pixels. It does not, to be sure, actuate a lever or display an image. But this "missing" last step is not fatal to its patent eligibility. Nor would the presence of such a "display" step by itself have rendered eligible otherwise ineligible subject matter.

Section 101 analysis is treacherous. Abstract ideas lend themselves to identification rather than definition. But where, as here, the Federal Circuit inserts a point on the patent-eligibility side of the spectrum for an invention like the one claimed in *RCT*, Section 101 is a doubtful defense for factually similar claims such as the ones Vizio challenges in this case. The Court, consequently, denies Vizio's motion that the '842 patent claims are directed to ineligible subject matter.

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C. The asserted claims of the '840 patent are not indefinite under 35 U.S.C. § 112, ¶2

Claim 56 of the '840 patent recites "[a] method of determining entropy of a pixel of a real time streaming digital video image signal, for automatically correcting an error produced during real time editing of the real time streaming digital video image input signal . . . ." '840 at 25:22-25. The method claim has three main steps: (a) receiving and characterizing a signal; (b) assigning and characterizing a local neighborhood of pixels; and (c) determining the entropy of various pixels. *Id.* at 25:22-26:17. Step C has four sub-steps: (i) calculating inter-local neighborhood pixel parameters in previous and next temporal fields; (ii) calculating intra-local virtual-pixel neighborhood parameters in the current field; (iii) adjusting values of pixel entropy counters for each pixel in previous, next, and current fields; and (iv) using the entropy counter values to calculate entropy values for each pixel in previous, next, and current fields. *Id.* Sub-step (iv) of step (c) applies these entropy values to assign a real value to a virtual pixel in a current field, thereby correcting an error produced during real time editing of the streaming digital video image input signal. *Id.*

Vizio's indefiniteness argument is based on the purported insoluble ambiguity of two terms in Claim 56: (1) "determining the entropy;" (2) "regional sum of weighted distances." The court addresses each in turn.

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1. "determining the entropy"

Vizio argues that the insoluble ambiguity of "determining the entropy" in step (c) of Claim 56 renders the claim indefinite under 35 U.S.C. § 112, ¶2. Mot. at 18. The parties previously stipulated that "entropy" means "the degree or extent of randomness or disorder." Mot. at 8 (citing Joint CC Stmt at 1). Thus, the subject of claim construction is the claim term "determining" as that word is used in the phrase "determining the entropy." The patentee provides a special definition in the claims (which are part of the specification) for this instance of "determining" in step (c) of Claim 56. According to this special definition, "determining the entropy" is in fact a sub-process with four composite steps:

> [S]aid ***determining comprising the steps of***:
>
> (i) ***calculating values of pixel inter-local neighborhood parameters*** for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;
>
> (ii) ***calculating a value of a virtual-pixel intra-local neighborhood parameter***, for each said virtual pixel in said current field;
>
> (iii) ***adjusting a value of a pixel entropy counter*** for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and

(iv) ***calculating a value of the entropy*** of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said pixel entropy counters of said pixels, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.

'560 at 25:27-26:16.

The combined effect of the parties' stipulation concerning the meaning of "entropy" and the patentee's special definition of "determining" is that "determining the entropy" means "determining the degree or extent of randomness or disorder," where "determining" is a sub-process comprising the sub-steps of: (i) calculating values of pixel inter-local neighborhood parameters; (ii) calculating a value of a virtual-pixel intra-local neighborhood parameter; (iii) adjusting a value of a pixel entropy counter; and (iv) calculating a value of the entropy.

To the extent any sub-step *within* "determining the entropy" is insolubly ambiguous, "determining the entropy" itself is insolubly ambiguous and thus indefinite. Vizio cites the '840 patent specification's failure to describe any technique for determining pixel entropy. Mot. at 18. This is a doubtful allegation because the specification devotes almost three-hundred lines to detail the inner

workings of the four sub-steps of the Claim 56 (c) "determining the entropy" sub-process. '840 at 11:42-15:62. Perhaps Vizio meant to argue that the '840 patent specification lacks a description of any technique for "calculating the value of the entropy", i.e., the ultimate step in the four-step "determining the entropy" sub-process.

Either way, Vizio's argument relating to the deficiency of the '840 specification sounds in ¶ 6 of 35 U.S.C. § 112 – not ¶ 2. Under ¶ 6, disclosure deficiencies in the specification can render claims indefinite. But to trigger ¶ 6's disclosure requirements, the patent claim must be "expressed as . . . a ***step for*** performing a function without the recital of . . . acts in support thereof . . . ." 35 U.S.C. § 112, ¶ 6. Furthermore, "such claims shall be construed to cover the corresponding . . . acts described in the specification and equivalents thereof." *Id.* Where the patent specification lacks disclosure of an act for performing a process step, the Court is unable to construe the step-plus-function claim under the claim construction rule of ¶ 6, rendering such a claim unamenable to claim construction, i.e., indefinite.

By contrast, 35 U.S.C. § 112, ¶ 2 requires that "[t]he specification shall conclude with . . . claims particularly pointing out and distinctly claiming the subject matter which the inventor . . . regards as the invention." Notably missing in ¶ 2, unlike in ¶ 6, is any "special" claim construction rule limiting claim scope to

those acts described in the specification and equivalents thereof. In fact, the general principles of claim construction which apply to claims analyzed under ¶ 2 *forbid* importing limitations from the specification into the claims, which, incidentally, is *the* claim construction rule for claims analyzed under ¶ 6. Put another way, Vizio's argument would have been case-dispositive under ¶ 6 but the same argument is an invitation to import limitations from the specification into the claims under ¶ 2.

To be sure, patent claims must be construed *in light of* the specification. And disclosure deficiencies in the specification *could* potentially render a claim indefinite even under ¶ 2, e.g., where a special definition, intentional disclaimer, or disavowal in the specification *itself* renders a claim term insolubly ambiguous. But as a general matter, disclosure deficiencies in the specification threaten the indefiniteness-based validity of ¶ 6 claims (means-plus-function or step-plus-function), not ¶ 2 claims. Under ¶ 2, the focus of the examination is on the claims themselves as opposed to the specification. The specification is of concern for the analyses of enablement and written description, i.e., ¶ 1, which is not the basis of Vizio's motion.

Vizio's charge that the '840 patent specification lacks a description for performing the "step[] of . . . calculating a value of the entropy," therefore, only renders the calculating step indefinite if: (1) ¶ 6 applies; or (2) if this disclosure

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deficiency in the specification renders the claim term "step[] of . . . calculating a value of the entropy" insolubly ambiguous.

First, the Court finds that the absence of the words "step for" creates a presumption that ¶ 6 does not apply. Furthermore, the sub-step "calculating a value of the entropy" is a recited act which, in the light of the rest of the claim, corresponds to the function of "determining the entropy." *Second*, the Court finds that to the extent the specification does not explain how to "calculate a value of the entropy," that does not impact the Court's ability to construe the claim term "calculate a value of the entropy" under the general canons of claim construction. The plain and ordinary meaning of "calculating" applies. The specification lacks any special definition, intentional disclaimer, or disavowal pertaining to the claim term "calculating." As does the file history. The intrinsic or extrinsic evidence does not indicate that "calculating" is a special term of art in the relevant field of digital signal processing.

The claim language "step[] of . . . calculating a value of the entropy of each . . . pixel . . . from . . . values of . . . pixel entropy counter[]," '840 at 25:43, 25:64-26:1-5, notifies artisans that Claim 56 covers *any way* of calculating pixel entropy values ***from pixel entropy counter values***. Methods not involving entropy counter values are outside the claim scope. Thus, Vizio's point that the "classic" method of calculating entropy does not use pixel entropy counter values only establishes that

one particular well-known entropy-calculation method falls outside the scope of Claim 56. *See* Mot. at 18. It does not establish indefiniteness.

Vizio next analogizes the facts in the instant case to those attending *Honeywell International, Inc. v. International Trade Commission*, 341 F.3d 1332 (Fed. Cir. 2003) to support its indefiniteness argument. The Court finds that *Honeywell* is distinguishable in key aspects. The *Honeywell* claim recited:

> A process for production of a drawn polyethylene terephthalate yarn which translates to a high tenacity dimensionally stable tire cord, comprising:
>
> > (A) extruding a molten melt-spinnable polyethylene terephthalate having an intrinsic viscosity of 0.8 or greater through a shaped extrusion orifice having a plurality of openings to form a molten spun yarn,
> >
> > (B) solidifying the spun yarn gradually by passing the yarn through a solidification zone which comprises (a) a retarded cooling zone and (b) a cooling zone adjacent said retarded cooling zone wherein said yarn is rapidly cooled and solidified in a blown air atmosphere,
> >
> > (C) withdrawing the solidified yarn at sufficient speed to form a crystalline, partially oriented yarn with a crystallinity of 3 to 13% and a ***melting point elevation of 2 to 10 C.***, and
> >
> > (D) hot drawing the yarn to a total draw ratio between 1.5/1 and 2.5/1.

Id. at 1335 (quoting Claim 1 of U.S. Patent No. 5,630,976) (emphasis added).

As shown above, the process claim in *Honeywell* covered physical properties of the yarn at different stages of production. Critically, different techniques of measuring the melting point elevation ("MPE") yielded different MPE

measurements. Because the actual value of the MPE, i.e., "***2 to 10 C***" was part of the claim itself, and because different measurement techniques yielded different MPEs, "the choice of sample preparation [was] critical to discerning whether a particular product [was] made by a process that infringe[d] the . . . patent claims." *Honeywell*, 341 F.3d at 1339 (citing the ITC's fact-finding which the appellant, Honeywell, did not challenge).

The above circumstances in *Honeywell* are distinguishable from the instant case. Whereas the *Honeywell* claims recited a specific range for MPE measurements as *an actual claim limitation*, the claims-in-dispute lack similar entropy ranges as a claim limitation; instead, they simply require calculating the value of entropy for various pixels – without requiring that the resulting calculations be within a specified range. Consequently, even if methods of calculating entropy yield different results (as did methods of measuring MPE), the choice of entropy-calculation methodology is not critical to discern whether a particular process is infringing. By contrast, the choice of MPE-measuring technique *was* critical because different techniques yielded different MPE values and a range of MPE values was a claim limitation.

As such, the language "step[] of . . . calculating a value of the entropy of each . . . pixel . . . from . . . values of . . . pixel entropy counter[] . . ." as interpreted in view of the specification adequately notifies the public that the scope

of the patentee's right to exclude is limited to those ways of calculating entropy which depend on entropy counter values. *See Honeywell Int'l v. Int'l Trade Commission*, 341 F.3d 1332, 1338 (Fed. Cir. 2003). To the extent the specification does not recite an exemplary formula for calculating entropy values, it only implicates enablement and written description concerns. The Court is not faced with a motion of invalidity under ¶ 1. Such specification deficiencies do not render the claim language unamenable to construction. The '840 patent claims, like any claims in an issued patent, enjoy a presumption of validity. This presumption extends to enablement, written description, etc. As such, the Court cannot, *sua sponte*, rely on evidence directed to an indefiniteness argument and use it to invalidate a patent claim on grounds not raised by the movant without giving the patentee non-movant an opportunity to put forth a defense.

(2) "regional sum of weighted distances"

Claim 56 requires the calculation of "values of pixel inter-local neighborhood parameters . . . whereby each said value of each said pixel inter-local neighborhood parameter represents a ***regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood*** . . . ." Vizio argues that "the '840 patent does not define or describe how to calculate the 'regional sum of inter-local neighborhood weighted distances.'" Mot. at 19 (citing Hemami Decl., ¶38). Again,

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this looks and sounds like a 35 U.S.C. § 112, ¶ 1 enablement argument made in a summary judgment motion under ¶ 2. A patent specification can, at once: (1) contain a written description of the invention which enables any person skilled in the art to make and use the same, thereby satisfying the enablement requirement of ¶ 1; but (2) fail to conclude with claims particularly pointing out and distinctly claiming the subject matter which the inventor regards as the invention, thereby failing to satisfy the definiteness requirement of ¶ 2.

Here, the claim term "regional sum of inter-local neighborhood weighted distances" is amenable to construction. The Court has already construed the claim term "local neighborhood of neighboring pixels" in its Claim Construction order. The remainder of the claim lacks terms of art. The "***sum of . . . distances*** measured between . . . pixels located in subsets of . . . local neighborhood" derives its plain and ordinary meaning.

Vizio points out that pixels have luminance values and grid locations and that Claim 56 and the '840 specification fail to reference these luminance values. Mot. at 20. Vizio argues that "to the extent 'distance' is meant to refer to an amount of space between pixels, it would render Claim 56 completely inoperative and useless because such distances would not yield information about pixel entropy." Mot. at 20 (citing Hemami Decl., ¶39). Again, a claim can be completely inoperative and useless, thereby failing the requirements of enablement under ¶1, yet sufficiently

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convey its boundaries to the artisan armed with the patent, thereby satisfying ¶2. Vizio has not moved for summary judgment for lack of enablement. Consequently, Oplus has not had an opportunity to put forth an enablement defense. Likewise, Vizio's citations of Oplus's infringement contentions do not persuade the Court that a presumptively definite patent is indefinite just because the patentee's infringement contentions give rise to ambiguity.

Vizio ends its ¶ 2-based challenge with the statement, "Neither Oplus nor the '840 patent explain how *distances* can be used to provide information about pixel entropies." Again, the Court fails to see the relevance of chastising the inoperability of a patent claim in a summary judgment motion of indefiniteness. Perhaps the intuition underlying such an indefiniteness challenge is that a person having ordinary skill in the art would presume that the patented claim *works* for the tasks it sets out to accomplish; in that context, the argument must go, the claims are insolubly ambiguous because they *cannot* mean something that yields an operative invention.

This intuition is an impermissible blurring of the different requirements of enablement and definiteness. The purpose of the definiteness requirement is to ensure that the claims delineate the scope of the invention using language that adequately notifies the public of the patentee's right to exclude. *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005). Particularly in the

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present era of central claiming where "the name of the game is the claim,"[3] the chief purpose of the definiteness requirement is to provide notice, to the artisan, of the boundaries of the patent right. By contrast, enablement is less about notice and more about enriching the public domain with the disclosure of a working invention, which the public can then duplicate after the expiry of the patent. *See Crown Operations Int'l, Ltd. v. Solutia, Inc.*, 289 F.3d 1367, 1378-79 (Fed. Cir. 2002) ("The purpose of the enablement requirement is to ensure that the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims."); *Grant v. Raymond*, 31 U.S. 218 (1832) (noting the necessity of an enabling disclosure to give the public the benefit of the invention after the patent shall expire).

The Court finds that Vizio's arguments relating to inoperability of Claim 56 do not amount to a clear and convincing showing that the claim is invalid as indefinite. *See Miles Labs. Inc. v. Shandon, Inc.*, 997 F.2d 870, 875 (Fed. Cir. 1993) (dismissing the defendant's argument as "irrelevant to definiteness under §112, ¶2. "The invention's operability may say nothing about a skilled artisan's understanding of the bounds of the claim. [Defendant's] argument is possibly relevant, however, to the enablement requirement of §112, ¶1."); *In re Borkowski*, 422 F.2d 904, 909 (C.C.P.A. 1970) (noting that a claim of clear scope that is not

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[3] Giles S. Rich, *The Extent of the Protection and Interpretation of Claims – American Perspectives*, 21 INT'L REV. INDUS. PROP. & COPYRIGHT L. 497, 499, 501 (1990). Indeed, unclaimed disclosures are dedicated to the public. *Johnson & Johnson Assocs. Inc. v. R.E. Serv. Co.*, 285 F.3d 1046, 1051 (Fed. Cir. 2002) (*en banc*).

adequately supported by an enabling disclosure commensurate with that scope is objectionable under §112, ¶1, not §112, ¶2); *Personalized Media Commc'ns, LLC v. Int'l Trade Comm'n*, 161 F.3d 696, 706 ("However, we express no opinion on any theory of invalidity under §112, ¶ 1 because such a ground of decision is not before us . . . .").

D. The asserted claims of the '840 patent are directed to patentable subject matter under 35 U.S.C. § 101.

The '840 patent is directed to a method for determining entropy of a pixel of a real time streaming digital video image signal. '840 at 5:11-13. The patent describes the claimed method as particularly applicable for identifying the origin of, and processing, in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals, and for correcting errors produced during editing of streaming digital video image signals." *Id.* at 5:13-18.

Claim 56 does not include a limitation for identifying the origin of video signals. But it does include a limitation for correcting errors produced during editing of video signals, as Vizio acknowledges. Mot. at 24. Vizio argues:

> Claim 56 ends with a step of "deciding" based on "logical operations," which is itself a mathematical algorithm. Koole Decl., ¶4, Exh. C, '840 Patent at Claim 56 at Step (c) (iv). Claim 56 recites that this decision is "***for*** assigning a real value to said virtual pixel in said current field . . . ." *Id.* However, that part of the claim is a mere statement of *intended use* that does not limit the claim.

Mot. at 24.

Step (c) (iv) of Claim 56 requires:

> ***calculating a value of the entropy*** of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said pixel entropy counters of said pixels,
>
> > ***whereby*** said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal ***are used for*** automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.

'840 at 25:64-26:16 (emphasis added).

"To infringe a method claim, all steps of the claimed method must be performed." *Mirror Worlds, LLC v. Apple, Inc.*, 692 F.3d 1351, 1358 (Fed. Cir. 2012); *see also* 35 U.S.C. § 271. It follows, therefore, that to infringe Claim 56, one must perform step 56 (c)(iv). Put another way, one must "calculat[e] a value of the entropy . . . ***whereby*** said values of the entropy . . . ***are used for*** automatically deciding . . . not to use values . . . for assigning a real value to said virtual pixel . . . thereby correcting an error produced during real time editing of the streaming digital video image input signal."

The claim under consideration, therefore, recites a "whereby" clause followed by the recited use for error-correction. If the whereby clause is limiting, then the

claim as a whole is directed to patent-eligible subject matter. If the whereby clause is non-limiting, then the claim as a whole is directed to the determination of a statistical measure of data representing image pixel intensity. A preliminary determination of whether the "whereby" clause is limiting, therefore, is critical to the Section 101 analysis in this case.

In *Hoffer v. Microsoft Corp.*, 405 F.3d 1326 (Fed. Cir. 2005), the Federal Circuit ruled that the whereby clause in the following claim was limiting:

> A method of messaging among at least two remote user terminals ("RUTs") in addition to a host computer ("Host") that uses communication software and hardware to connect to a communication network that supports asynchronous transport mode and serial data transmission, said Host serving as a central messaging information center that provides a plurality of RUTs with data in an integrated application program interface ("IAPI") that coordinates the operation for said Host's other sub-systems that comprise a programmable application ("PA") supporting IAPI menu functions, system commands, and store-and-forward messaging, an index system reflecting at least one published index that divides broad economic activity into mutually exclusive numbered topics that are used routinely in public and private sectors, a memory configured to correspond to said index system using an operating system, said PA's configuration editor for storage, and PA files, and said method comprises the steps of:
>
> storing in said Host's memory, file capacity calibrated to each subdivision of said index system;
>
> modifying said Host's memory, using said PA to store in a complete series those topic boards identified by multiple-digit numbers that match all multiple-digit numbers in said index system;
>
> storing inside said IAPI sufficient logical progressions of menus with commands for a user at any of said plurality of RUTs to select from said topic boards and enter a topic board matching an index number therein by entering input associated with said index number;

> and establishing communications over said network between said Host and said plurality of RUTS to enable said PA to control said Host's processing of said RUTs's commands, and transmit over multiple lines messages and data on a selected topic board;
>
> ***whereby a trade network supports users at said plurality of RUTs who are each guided by said IAPI to select an economic activity, to identify that index topic that corresponds to said activity, to enter that topic board dedicated to said topic, and who are collectively able to concurrently engage in interactive data messaging on said topic boards***.

Id. at 1329.

The Federal Circuit noted that as a general matter, "a 'whereby' clause generally states the result of the patented process. However, when the 'whereby' clause states a ***condition that is material to patentability***, it cannot be ignored in order to change the substance of the invention." *Id.* (emphasis added). The Federal Circuit noted that the whereby clause in the above claim described "a network of users at multiple remote user terminals who are 'collectively able to concurrently engage in interactive data messaging' . . . and [t]his capability is ***more than the intended result of a process step; it is part of the process itself***." *Id.* at 1330 (emphasis added). "This interactive element," the Federal Circuit noted, "is described in the specification and prosecution history as an integral part of the invention. The Summary of the Invention recites that '[f]rom a remote terminal, the user would enter selected topic boards on a Host Terminal System ('Host System') to address messages to, and receive messages from, other intended

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users.'" *Id.* The prosecution history also contained an amendment which disclaimed that the newly added patent claim is an independent method claim that solely taught methods distinct from real-time messaging. *Id.*

The summary of the invention in the '840 specification recites "The method of the present invention is particularly applicable for . . . correcting errors produced during editing of streaming digital video image signals." '840 at 5:16-18. After describing the process for determining the entropy of various pixels, the patent specification describes error correction as "[a]nother very useful application of the method of the present invention." *Id.* at 16:13. During the prosecution of the '840 patent, the PTO examiner rejected Claims 1-80 of the application as directed to ineligible subject matter, disagreeing with the applicant's argument that a "pixel is not a basic mathematical construction but rather is a portion of an image or picture which is also not a mathematical construct." Response to Arugments, OPLUS000217 (Page 2) ('840 file history). "Claims 1-80 recite the mere manipulation of data or an abstract idea, or merely solve a mathematical problem without a limitation to a practical application." *Id.* Reciting the now defunct useful-concrete-tangible test, the examiner rejected the application. The patentee overcame these rejections by amending Claim 1's preamble with an application of the entropy calculation method, "A method for determining entropy of a pixel of a real time streaming digital video image signal <u>to identify the origin of, and process,</u>

in real time, pixels of interlaced, non-interlaced, or de-interlaced, streaming digital video image signals." OPLUS000226. In his remarks, the patentee noted the amendment to Claim 1 and highlighted the identical practical application recited in Claims 30 and 56, "automatically detecting the nature of a video source, by identifying the original mode of the real time streaming digital video image input signal." OPLUS000242.

Of course, Claim 56 lacks the patentee's then-quoted application clause for signal-source detection. Instead, the application clause in Claim 56 pertained to error-correction. Nonetheless, the examiner allowed the patent to issue – presumably after the applicant amended Claim 1 and highlighted, albeit incorrectly for Claim 56, the application limitation of Claims 30 and 56. Notwithstanding the patentee and examiner's collective error or combined oversight, the fact remains that the file history evidences the role of the *application* of the entropy calculation in the issuance of the '840 patent. The question whether the whereby clause is non-limiting is one of claim construction. As such, the intrinsic record, including the specification and file history, is an important consideration when giving limiting effect to the whereby clause. For the Court has an obligation to construe claims *in light of* the specification. Granting effect to the whereby clause is also consistent with the canon of construing claims with an eye toward giving effect to all terms in the claim. *Digital-Vending Servs.*, 672 F.3d at 1275.

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"A whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." *Minton v. National Ass'n of Securities Dealers, Inc.*, 336 F.3d 1373, 1381 (Fed. Cir. 2003). Here, although the whereby clause does express the intended result of the process step of calculating entropy values, it does not *simply* express them. Like the *Hoffman* whereby clause, Claim 56's whereby clause is part of the process itself. "Regardless of what statutory category ('process, machine, manufacture, or composition of matter,' 35 U.S.C. § 101) a claim's language is crafted to literally invoke, ***we look to the underlying invention for patent-eligibility purposes***." *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1374 (Fed. Cir. 2011).

The Court acknowledges the Supreme Court's recent statement that "[l]imiting an idea to one field of use . . . [does] not make the concept patentable." *Bilski v. Kappos*, 130 S.Ct. 3218, 3231 (2010). One could argue that, in this case, the field of use is auto-correction. But that principle must be applied with consideration of whether the idea is merely being *limited* to one field of use or whether the field of limited use is part of the idea itself. Here, because the Court gives limiting effect to the whereby clause, the error-correction application is part of the process itself, i.e., part of the claimed idea itself. The patent specification and file history confirm that the claimed invention is a palpable application in the field of video signal processing, specifically – error correction.

The conclusion just reached applies to claim construction both for invalidity as well as for infringement analysis. "It is axiomatic that claims are construed the same way for both invalidity and infringement." *Source Search Techs., LLC v. LendingTree, LLC*, 588 F.3d 1063, 1075 (Fed. Cir. 2009) (citing *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1330 (Fed. Cir. 2003)); *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1363 (Fed. Cir. 1998) ("Claims must be interpreted the same way for determining infringement as was done to sustain their validity."); *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576 (Fed. Cir. 1995) ("Claims may not be construed one way in order to obtain their allowance and in a different way against accused infringers."); *Beachcombers, Int'l, Inc. v. WildeWood Creative Prods., Inc.*, 31 F.3d 1154, 1163 (Fed. Cir. 1994) ("We have already interpreted the claims for purposes of assessing their validity. The same claim interpretation of course applies to the infringement analysis.").

Consequently, the "whereby" clause of Claim 56 (c) (iv) which recites the error correction application of the calculated entropy values ***limits the claim scope*** for infringement analysis. Put another way, to infringe Claim 56, it does not suffice to determine pixel entropy. One must also perform the error-correction process recited in the "whereby" clause of Claim 56 (c) (iv). That clause recites "whereby said values of the entropy . . . are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values . . . for assigning a

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real value to said virtual pixel . . . thereby ***correcting an error produced during real time editing of the streaming digital video image input signal***." In the context of this case, if Vizio's products do not *apply* the calculated pixel entropy values to "*correct[] an error produced during real time editing of the streaming digital video image input signal*" in accordance with the provisions of the "whereby" clause in Claim 56 (c) (iv), then they cannot literally infringe Claim 56.

That said, the Court denies Vizio's motion that the '840 patent is directed to patent-ineligible subject matter.

V. Conclusion

Vizio has not demonstrated by clear and convincing evidence that the asserted claims in the '840 and '842 patents are insolubly ambiguous. Furthermore, the Court finds that the '840 and '842 patent claims are directed to palpable applications in the field of video signal processing. Consequently, the Court denies Vizio's motion for summary judgment of invalidity for the '840 and '842 patents.

IT IS SO ORDERED.

DATED: March 4, 2013

Mariana R. Pfaelzer

Hon. Mariana R. Pfaelzer
United States District Judge

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IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (E) **JOINT STIPULATION RE: OPLUS' MOTION TO COMPEL PRODUCTION OF DOCUMENTS** **Date: April 15, 2013** **Time: 11:00 AM** **Courtroom:12** **Judge: Mariana R. Pfaelzer** **Discovery Cutoff: April 15, 2013** **Pretrial Conf.: TBD** **Trial Date: TBD**

I. INTRODUCTIONS

A. OPLUS' INTRODUCTORY STATEMENT

In this patent infringement action VIZIO refuses to produce *any* documents related to infringement or damages. Rather, VIZIO has unilaterally decided to produce only alleged prior art, contending that it has no obligation to provide discovery because it is unsatisfied with Oplus' infringement contentions.

VIZIO's claim that Oplus' infringement contentions are unsatisfactory cannot reasonably serve as a basis for its refusal to participate in discovery. Oplus served its infringement contentions on August 9, 2012, identifying fourteen VIZIO televisions then known to infringe the patents-in-suit. Additionally, Oplus attached claim charts to its infringement contentions, identifying the specific technologies incorporated in these VIZIO products relevant to an infringement analysis.

Following service of its infringement contentions, on September 6, 2012, Oplus served VIZIO with Requests for Production of Documents. VIZIO responded that it would only produce documents responsive to eleven of Oplus' sixty-six requests. Despite VIZIO's stated intention to produce documents related to Requests Nos. 1, 2, 9, 10, 15, 16, 21, 22, 28, 53, and 59, as of the filing of this Motion, VIZIO has only produced alleged prior art in support of its invalidity defense (presumably in response to only Requests Nos. 16 and 21).

Oplus has also served three sets of interrogatories on VIZIO totaling twelve interrogatories. VIZIO objected to each interrogatory on several grounds and only attempted to provide substantive responses to three interrogatories. VIZIO refused to respond to the remaining interrogatories – including all which pertained to infringement and damages – on the grounds that (1) the requests were premature because they related to claims of infringement that might not survive claim construction and (2) Oplus' interrogatories contained discrete subparts in excess of the twenty-five permitted by the Federal Rules of Civil Procedure.

From November to January Oplus was focused on claim construction and, then, on VIZIO's motion for summary judgment. Following the Court's January 14, 2013 claim construction ruling, Oplus immediately wrote to VIZIO insisting that VIZIO promptly provide documents and substantively respond to Oplus' interrogatories. (Ex. 1.) Regarding VIZIO's plethora of objections, Oplus stated:

> To the extent VIZIO believes that it is unable or unwilling to respond to a particular interrogatory based on one of the several objections, please immediately indicate the concern so these issues can be resolved in a timely manner.
>
> ***
>
> To the extent VIZIO believes that it is unable or unwilling to provide documents related to any particular request for production based on one of the several objections, please immediately specify the reason for the continued failure to produce so that the parties may meaningfully meet and confer to resolve any remaining disputes before Oplus seeks relief from the Court.

(*Id.*) Oplus requested a meet and confer for the following week. (*Id.*) VIZIO did not respond, and Oplus attempted further correspondence on February 12, 2013. On February 20, 2013, VIZIO finally responded; yet, rather than address the issues raised in Oplus' letter, VIZIO instead opted to re-raise complaints about Oplus' discovery responses. (Ex. 2.) Notably, Oplus had already addressed VIZIO's concerns months earlier without objection from VIZIO and considered the matter resolved. (Ex. 3.) VIZIO's attempt to manufacture a tit-for-tat discovery dispute in order to excuse its own conduct is unacceptable. Critically, VIZIO's only remaining excuse for its failure to produce documents or respond to interrogatories is that VIZIO is unsatisfied with Oplus' infringement contentions.

On February 22, 2013, counsel for Oplus and VIZIO met and conferred over the telephone. Oplus insisted upon an immediate production of documents, but VIZIO maintained its position that it need not provide documents or substantive interrogatory responses until Oplus supplemented its infringement contentions to VIZIO's satisfaction. This motion now follows.

B. VIZIO'S INTRODUCTORY STATEMENT

Oplus asks the Court to do two things: (1) allow Oplus to ignore its obligation to provide compliant infringement contentions by ordering broad reaching discovery into products utilizing technologies having no demonstrated relevance to the patents-in-suit, and (2) extend the discovery cut-off by four (4) months so Oplus can take discovery that it waited more than one year after filing this lawsuit to take. The Court should refuse to do either.

The entire point of Oplus' broad, unfocused discovery is to force VIZIO to produce documents on numerous, irrelevant products, with the intention of labeling these numerous products as "relevant" and "infringing" without any basis. For this reason, Oplus has refused for more than six (6) months to provide compliant infringement contentions that provide fair notice of the accused product features and technologies that are relevant to its asserted patent claims. Instead, it served requests for production directed to any VIZIO products that utilize any of three broad technology "suites" that Oplus unilaterally deemed "relevant." Oplus' infringement contentions, however, reveal that it had no basis for asserting claims of infringement against even the accused products because it had no information indicating that many of the claim limitations in the asserted patents were met. Any information possessed by VIZIO will not assist Oplus in this regard, as this information, if available, is in the possession of third party chip manufacturers, a fact noted to Oplus a year ago when VIZIO filed its motion to transfer this case to the Central District of California. Therefore, hoping to use the discovery process to fish for documents related to an overly expansive list of products that are not relevant to this case, Oplus refuses to remedy its deficient infringement contentions and now asks the Court to provide discovery on all these irrelevant products that Oplus has yet to show could possibly be related to its infringement claims. In addition, at the last possible moment, Oplus seeks to extend the discovery cut-off

by four (4) months based on a "crisis" that is entirely of its own making. There is no basis for granting Oplus' motion to compel or its request to extend the discovery cut-off.

Oplus also misleads the Court by arguing that VIZIO has failed to produce documents that it previously agreed to produce. Oplus omits a key fact: there is no protective order in place in this case. The requests for which VIZIO agreed to produce responsive documents call for confidential and highly confidential information that VIZIO agreed to produce *pursuant to a protective order*. The parties are continuing to negotiate the protective order, and VIZIO has agreed to all of Oplus' requested modifications with the exception of one dealing with consulting experts' receipt of protected information. Once the protective order is entered, VIZIO will produce what it agreed to produce. However, VIZIO merely *distributes* the accused products. As Oplus has known since no later than March of *last* year, most of the documents sought by Oplus are in the hands of third party suppliers, including documents that describe the specific video processing algorithms used at the pixel level. Nevertheless, Oplus waited until February 2013 -- fourteen months after filing this lawsuit -- to seek discovery from VIZIO's suppliers. Having waited so long, Oplus should not be heard to complain that it needs additional time to resolve alleged discovery disputes with the suppliers.

II. VIZIO'S ALLEGED REFUSAL TO PRODUCE DOCUMENTS

A. DOCUMENT REQUESTS TO WHICH VIZIO OBJECTED ON THE GROUNDS THAT OPLUS' INFRINGEMENT CONTENTIONS WERE DEFICIENT (REQUESTS NOS. 3-8, 13, 17-19, 23-27, 29-40, 49, 51, 56-58, 60-66)

1. Oplus' Position

VIZIO has flat-out refused to produce documents responsive to fifty-five of Oplus' document requests. VIZIO objected to thirty-nine of these requests on the grounds that Oplus' infringement contentions were deficient. During the February

22, 2013 meet and confer between the parties VIZIO reiterated its claim that deficient infringement contentions were the reason for its ongoing refusal to produce documents.

Rule 37 provides that "[a] party seeking discovery may move for an order compelling an answer, designation, production, or inspection." Fed. R. Civ. P. 37. Pursuant to this Rule, Oplus seeks an order compelling VIZIO to produce documents to each of the requests listed below. VIZIO's position, that it will not provide any discovery until Oplus provides infringement contentions that it deems satisfactory, is not just untenable, it undermines the entire discovery process.

A party cannot withhold relevant discovery on the grounds that an opposing party has failed to meet its own discovery obligations. Courts have consistently rejected this "tit-for-tat" approach to discovery. *See Genentech, Inc. v. The Trustees of the Univ. of Penn.*, 2011 U.S. Dist. LEXIS 66390, at *5 (N.D. Cal. June 10, 2011) ("A party may not excuse its failure to comply with discovery obligations by claiming that its opposing party is similarly delinquent. Nor may a party condition its compliance with its discovery obligations on receiving discovery from its opponent."); *Richardson v. City of Antioch*, 2009 U.S. Dist. LEXIS 129505, at *4 (N.D. Cal. April 13, 2009) ("The Court does not look favorably upon a 'tit-for-tat' approach to discovery. A party may not withhold relevant discovery simply on the basis that the other side has not been forthcoming with discovery."); *Fresenius Med. Care Holding Inc. v. Baxter Int'l, Inc.* 224 F.R.D. 644, 653 (N.D. Cal. 2004); *Jayne H. Lee, Inc. v. Flagstaff Indus., Corp.*, 173 F.R.D. 651, 656-57 (D. Md. 1997) (Refusing to sanction counsel's attempts to "convert pretrial discovery into a game of brinksmanship" and holding that counsel may not "hold his client's interrogatory answers and responsive documents hostage" in retaliation); *Arkwright Mut. Ins. Co. v. Nat. Union Fire Ins. Co. of Pittsburgh, Pa,* 1993 U.S. Dist. LEXIS 1163, at *8 (S.D.N.Y. Feb. 4, 1993)

("[A]dopting a tit-for-tat schedule would only slow the [discovery] process."). Thus, although Oplus certainly disputes VIZIO's claim that its infringement contentions are deficient, the sufficiency of these contentions is irrelevant to the question of whether VIZIO must meet its own discovery obligations.

In *Jayne H. Lee, Inc.*, plaintiff refused to produce documents or respond to interrogatories on the grounds that defendant's own discovery responses were deficient. 173 F.R.D. at 656. In response to defendant's motion to compel, plaintiff argued that the court deny defendant's motion and require both parties to simultaneously make a mutual exchange of discovery. *Id.* The court stated that it had seldom "heard a less persuasive argument" and that plaintiff's approach to discovery was contrary to both the "text and spirit of the discovery rules." *Id.* at 656-57. The court granted defendant's motion to compel, and held that plaintiff's total failure to respond in a timely fashion operated as a waiver to all other objections, other than those based on privilege. *Id.* at 657.

VIZIO's proposition that a defendant can unilaterally refuse to respond to discovery requests when it deems a patentee's infringement contentions deficient has no basis in the law or the rules of civil procedure. VIZIO is essentially proposing that infringement contentions are not only a bar that a patent infringement plaintiff must meet to proceed with its case, but that the judge of whether that bar has been met is the adverse party. VIZIO suggests that patent infringement defendants are inherently granted a unique authority to control the progress of discovery, and thus the litigation entirely. VIZIO is wrong.

Worse, VIZIO does not just suggest such a unique authority, VIZIO has claimed this authority. In so doing, VIZIO baselessly denies Oplus any information relating to its claims of infringement and the appropriate measure of damages resulting therefrom. VIZIO wants Oplus to prove its infringement case without any discovery, but Oplus has no obligation to do so. Oplus has notified VIZIO of

the technology accused of infringement and specifically identified those products it knows to use such technology.. This notification was provided through claim charts that thoroughly detail Oplus' theories of infringement based on publicly available information. Oplus' infringement contentions are more than sufficient but, regardless, VIZIO cannot unilaterally grant itself the right to withhold discovery. Oplus respectfully requests that the Court order VIZIO to immediately produce documents responsive to the Oplus requests presented below.

Also, in an effort to resolve the dispute over the number of interrogatories without further delay, and hopefully obviate the need for court intervention, Oplus re-served twenty amended interrogatories on February 22, 2013, to which VIZIO later responded: "we agree to respond to Oplus' amended interrogatories… and that these amended interrogatories will serve as a replacement to Oplus' original interrogatories." Because Oplus recently served amended interrogatories to obviate VIZIO's disingenuous claim[1] about an excess number of interrogatories, VIZIO's responses to these interrogatories will not be due until the end of March. However, given VIZIO's prior and continued conduct, and liberal treatment of its discovery obligations under the Court's schedule and the rules, Oplus is concerned that VIZIO will continue to refuse to provide substantive answers to the amended interrogatories on the grounds that Oplus' infringement contentions are deficient. Accordingly, Oplus requests a ruling that VIZIO may not refuse to provide *any* discovery based on its improper objections concerning Oplus' infringement contentions.

[1] VIZIO's primary basis for its objection as to the perceived excess of interrogatories in violation of the Federal Rules of Civil Procedure is that several of the interrogatories seek identification of documents and persons with knowledge. By that same standard, VIZIO's requests well exceed the allowable 25 interrogatories.

To ensure that delay and prejudice caused by VIZIO's illegitimate refusal to participate in discovery is redressed, Oplus further requests that the Court hold that VIZIO's failure to timely respond to Oplus' discovery requests operates as a waiver to any other objections, other than those based on privilege.

Finally, Oplus respectfully requests that the Court modify the scheduling order entered by this Court to extend the period of fact discovery to August 15, 2013 to afford Oplus an opportunity to prepare its case in chief. Under the current scheduling order, discovery is set to close on April 15, 2013. (Ex. 4.) However, due to VIZIO's refusal to produce documents or respond to interrogatories, Oplus has significant discovery that it still must conduct. For example, Oplus has been unable to take depositions due to a lack of documents and interrogatory responses necessary to properly identify appropriate witnesses and inform the scope of a reasonable deposition. Moreover, Oplus may have to move to compel the production of documents from subpoenaed third-parties who are currently objecting on the ground that Oplus' seeks documents otherwise available from VIZIO, a party to this case. Oplus, of course, does not know what documents are in VIZIO's possession because VIZIO has refused to produce any.

2. VIZIO's Position

VIZIO's Interrogatory Responses. As a preliminary matter, Oplus makes several requests for remedies that are unavailable to it. First, Oplus makes an improper request that the Court issue an order regarding VIZIO's responses to a set of interrogatories that were "re-served" on February 22, 2013. VIZIO's interrogatory responses are not properly before the Court and therefore there is no basis for issuing any order related to them as Oplus has requested. VIZIO provided timely objections and responses to Oplus's original interrogatories. In response, however, Oplus *withdrew its original interrogatories* and served replacement interrogatories to remedy the excessive number of interrogatories in

the original set. VIZIO's responses to Oplus's replacement interrogatories are not yet due, and there are no answers or objections for the Court even to consider.

Oplus' Infringement Contentions are Deficient and Fail to Demonstrate the Relevance of the Discovery Oplus Seeks. The purpose of infringement contentions is to "make the parties more efficient, to streamline the litigation process, and to articulate with specificity the claims and theory of a plaintiff's infringement claim." *Implicit Networks, Inc. v. Hewlett-Packard Co.*, 2011 U.S. Dist. LEXIS 100283, at *4 (N.D. Cal. Sept. 7, 2011); *see also InterTrust Techs. Corp. v. Microsoft Corp.*, 2003 U.S. Dist. LEXIS 22736 at *8 (N.D. Cal. Nov. 26, 2003) (the purpose of infringement contentions is "to be nit picky, to require a plaintiff to crystallize its theory of the case and patent claims"). Instead of providing sufficient infringement contentions, Oplus has vaguely and ambiguously asserted that its patents cover broad ranges of technology suites in order to force VIZIO to produce documents on numerous, irrelevant products.

a. Oplus' Prolonged Refusal to Provide Intelligible Infringement Contentions that Frame he Relevant Scope of Discovery

Oplus seeks discovery of numerous categories of documents related to what it unilaterally asserts are "Relevant Products". Oplus defines "Relevant Products" as any products that "utilize Silicon Optix HQV Technology," "Faroudja DCDi technology," or "MediaTek motion adaptive de-interlacing technology." *See* Declaration of Charles C. Koole ("Koole Decl."), ¶2, Exh. A, Oplus' First Set of Requests for Production at 5; *Id.* at ¶3, Exh. B, Oplus' First Set of Interrogatories at 4.[2] Oplus' infringement contentions are ambiguous and inconsistent as to

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[2] Oplus defined "Relevant Products" as "(1) the products identified in Oplus' Initial Infringement Contentions, served on August 9, 2012 and (2) any products identified in Vizio's Responses to Oplus' Interrogatory to Nos. 1-3." *See* Koole Decl., ¶2, Exh. A, Oplus' First Set of Requests for Production. Oplus' Interrogatories Nos 1-3 include "all VIZIO products manufactured and/or sold from 2006 through the present that utilize" (1) "Silicon Optix HQV technology"; (2)

whether or how these technologies are "relevant" to its patent infringement claims. Thus, there is no basis for the wide ranging discovery Oplus seeks.

In September of last year, VIZIO sent a detailed letter to Oplus explaining these ambiguities and requesting that Oplus clarify and supplement its infringement contentions. Koole Decl., ¶4, Exh. C, September 18, 2012 Letter to Oplus Counsel. In particular, VIZIO explained that Oplus' infringement contentions suffer from two key defects: (1) they ambiguously and inconsistently define the particular accused product features that are at issue, and (2) they provide no information regarding how the accused products supposedly perform many of the claim limitations. Oplus ignored VIZIO's request for clarification and supplementation and did not even attempt to justify their many deficiencies, much less rectify them.

VIZIO explained that, for example, the phrase "Silicon Optix HQV Technology" refers to a "suite of technologies." In its infringement contentions, Oplus inconsistently suggests that the use of any portion of the technology suite is infringing, while at other times suggests that only those products using a "pixel-based motion adaptive deinterlacing" feature of the suite are infringing. Koole Decl., ¶5, Exh. D, Exh. A to Oplus' Infringement Contentions at 1. Moreover, Oplus' contentions merely assume that because the label "pixel-based motion adaptive deinterlacing" is allegedly used to describe certain components of "Silicon Optix HQV Technology," the accused products must perform the specifically required steps of the asserted '842 Patent claims. Oplus provides no support for this unwarranted and illogical assumption.

"Faroudja DCDi technology," and (3) "MediaTek motion adaptive de-interlacing technology." *See* Koole Decl., ¶3, Exh. B, Oplus' First Set of Interrogatories Nos. 1-3.

Similarly, VIZIO explained that Oplus' infringement contentions are indecipherable as to whether Oplus contends that "Faroudja DCDi technology," "Faroudja DCDi Cinema," or merely "motion adaptive noise detection" infringe the '840 Patent. Koole Decl., ¶4, Exh. C at 1. Furthermore, Oplus merely assumes that the use of the phrase "motion adaptive noise reduction" establishes that the accused technologies perform individual pixel entropy calculation steps set forth in a patent claim that is over a column in length. Oplus does little more than parrot or reformulate its claim language in its contentions. *Id.* at 2. Thus, Oplus has provided no basis for its assertion that products using "Faroudja DCDi technology", "Faroudja DCDi Cinema," or " motion adaptive noise detection" are relevant or discoverable. Similar defects apply to its contentions pertaining to "MediaTek MDDi Motion Adaptive Deinterlacing."

Contrary to Oplus' suggestion, VIZIO is not engaging in "tit for tat" discovery. Infringement contentions are fundamental to defining the appropriate scope of discovery in patent cases. In this case, Oplus' infringement contentions bear directly on the propriety of Oplus' definition of "Relevant Products" which infects many of the requests at issue. Given the centrality of infringement contentions in defining the proper scope of discovery, courts have stayed the discovery obligations of accused infringers until the patent holder provides compliant infringement contentions. The reason is manifest: The costs of discovery can be astronomical in patent cases and many of the documents sought contain sensitive business information. Oplus should not able to obtain far reaching and intrusive discovery merely by unilaterally asserting that something is relevant. The Court should refuse to order VIZIO to provide the discovery that Oplus seeks in view of Oplus' refusal to provide infringement contentions that demonstrate the relevance of the requested discovery. VIZIO has also asserted numerous other valid objections to Oplus' requests for production, none of which

RESPONSE TO DOCUMENT REQUEST NO. 64:

VIZIO incorporates by reference each of the foregoing General Objections.

VIZIO objects to this Request to the extent it calls for disclosure of documents protected by the attorney-client privilege, the work product doctrine, or any other applicable exemption from discovery. VIZIO further objects to this Request to the extent it seeks private, confidential, proprietary, trade secret, or other sensitive business data or information. VIZIO further objects to this Request as overly broad, unduly burdensome, and harassing.

VIZIO further objects to this Request on the grounds that this Request seeks information that is not relevant to this action or likely to lead to the discovery of admissible evidence. VIZIO further objects to this Request as vague and ambiguous to the extent the phrase "de-interlacing" is not defined or understood.

VIZIO further objects to this request on the grounds that Oplus' infringement contentions are vague, ambiguous, and inconsistent as to the technologies it accuses of infringement and because they fail to identify the particular steps and sequences of calculations carried out by the accused products which Oplus contends are infringing, as set forth in VIZIO's letter of September 18, 2012. Until Oplus corrects the deficiencies in its infringement contentions, this request is premature.

DOCUMENT REQUEST NO. 65:

All documents sufficient to identify why Vizio chose to incorporate Faroudja DCDi, Silicon Optix HQV, or MeditaTek technology in the Relevant Products.

RESPONSE TO DOCUMENT REQUEST NO. 65:

VIZIO incorporates by reference each of the foregoing General Objections.

VIZIO objects to this Request to the extent it calls for disclosure of documents protected by the attorney-client privilege, the work product doctrine, or any other applicable exemption from discovery. VIZIO further objects to this Request on the grounds that it assumes facts not in evidence, namely, that "VIZIO chose to incorporate" the listed technologies in the "Relevant Products." VIZIO further objects to this Request to the extent it seeks private, confidential, proprietary, trade secret, or other sensitive business data or information. VIZIO further objects to this Request as overly broad, unduly burdensome, and harassing.

VIZIO further objects to the extent this Request seeks documents that are not in VIZIO's possession, custody, or control. See, e.g., Oplus' July 21, 2012

Judicial Panel on Multidistrict Litigation Reply Brief at 3 ("Plainly, none of the discovery to be had about the technical details of such accused products can be obtained in California."). VIZIO further objects to this Request on the grounds that this Request seeks information that is not relevant to this action or likely to lead to the discovery of admissible evidence.

VIZIO further objects to the definition of "Relevant Products" to the extent it implies that any of VIZIO's products falling within this definition are relevant in any way to this case. As detailed in VIZIO counsel's September 18, 2012 letter to Oplus counsel, the Infringement Contentions provided by Oplus were drastically deficient, including because they are vague, inconsistent, and ambiguous as to the particular technologies that Oplus contends are infringing and because they fail to articulate how any of the accused products and technologies allegedly infringe the asserted patents. Accordingly, VIZIO further objects to Oplus' unilateral designation of VIZIO products as "relevant" without providing a valid basis.

DOCUMENT REQUEST NO. 66:

All documents sufficient to describe the implementation of Faroudja DCDi, Silicon Optix HQV, or MeditaTek technology in the Relevant Products.

RESPONSE TO DOCUMENT REQUEST NO. 66:

VIZIO incorporates by reference each of the foregoing General Objections.

VIZIO objects to this Request to the extent it calls for disclosure of documents protected by the attorney-client privilege, the work product doctrine, or any other applicable exemption from discovery. VIZIO further objects to this Request to the extent it seeks private, confidential, proprietary, trade secret, or other sensitive business data or information. VIZIO further objects to this Request as overly broad, unduly burdensome, and harassing.

VIZIO further objects to the extent this Request seeks documents that are not in VIZIO's possession, custody, or control. See, e.g., Oplus' July 21, 2012 Judicial Panel on Multidistrict Litigation Reply Brief at 3 ("Plainly, none of the discovery to be had about the technical details of such accused products can be obtained in California."). VIZIO further objects to this Request on the grounds that this Request seeks information that is not relevant to this action or likely to lead to the discovery of admissible evidence.

VIZIO further objects to the definition of "Relevant Products" to the extent it implies that any of VIZIO's products falling within this definition are relevant in any way to this case. As detailed in VIZIO counsel's September 18, 2012 letter to Oplus counsel, the Infringement Contentions provided by Oplus were drastically deficient, including because they are vague, inconsistent, and ambiguous as to the

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January 28, 2013

Via Electronic Mail
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apruetz@glaerweil.com

Re: *Oplus Technologies, Ltd. v. Sears Holdings Corp., et al.*,
Case No. CV12-5707 MRP (E)

Dear Ms. Pruetz:

I write to follow up regarding several deficiencies in VIZIO's responses to discovery in the above-captioned matter. While we originally disagreed (and so stated in the attached correspondence of September 26, 2012) with VIZIO's position that claim construction must precede most, if not all discovery, that objection is now clearly moot. VIZIO's remaining objections are insufficient to alleviate VIZIO of its discovery obligations and, accordingly, Oplus requests that VIZIO provide supplemental discovery responses without unnecessary delay.

I. VIZIO'S DEFICIENT RESPONSES TO OPLUS' INTERROGATORIES

VIZIO has failed to provide adequate responses to Oplus' First, Second and Third Sets of Interrogatories. As of today, VIZIO has only attempted to provide a response to Interrogatories Numbers 5, 6 and 10. For at least the same reasons enumerated in our previous correspondence, please immediately provide a supplemental response to each interrogatory. To the extent VIZIO believes that it is unable or unwilling to respond to a particular interrogatory based on one of the several objections, please immediately indicate the concern so these issues can be resolved in a timely manner.

Further, as stated in our previous correspondence, Oplus has not served interrogatories in excess of the 25 allowed by the Federal Rules of Civil Procedure. "Subparts count as one interrogatory if 'they are logically or factually subsumed within and necessarily related to the primary questions.'" *Waterbury v. Scribner*, 2008 WL 2018432, at *2 (quoting *Safeco of Am. V. Rawstron*, 181 F.R.D. 441, 445 (C.D. Cal. 1998)).

> Probably the best test of whether subsequent questions, within a single interrogatory, are subsumed and related, is to examine whether the first question is primary and subsequent questions are secondary to the primary question. Or, can the subsequent question stand alone? Is it independent of the first question? Genuine subparts should not be counted as separate interrogatories, notwithstanding [that] they are joined by a conjunctive word and may be related.

Kendall v. GES Exposition Servs., Inc., 174 F.R.D. 684, 685 (D. Nev. 1997) (quoted in *Waterbury* and *Safeco*).

Clearly, requests for identification of documents and persons with knowledge are subsumed and related within the primary interrogatory and, thus, should not count as separate interrogatories (note that this recognition alone reduces to 27 the total number of "discrete" interrogatories of 42 alleged by VIZIO). Likewise, Interrogatories Numbers 9 and 12 clearly include secondary questions subsumed within one or two primary questions.

In an effort to eliminate any confusion, the table below specifically identifies the parties' contentions with respect to all outstanding interrogatories.

INT No.	VIZIO's Contention	Oplus' Contention
1	Four distinct interrogatories: 1. Product identification 2. Sales volume 3. Identity of documents 4. Identity of persons	Two distinct interrogatories: 1. Product Identification 2. Sales Volume
2	Four distinct interrogatories: 1. Product identification 2. Sales volume 3. Identity of documents 4. Identity of persons	Two distinct interrogatories: 1. Product Identification 2. Sales Volume
3	Four distinct interrogatories: 1. Product identification 2. Sales volume 3. Identity of documents 4. Identity of persons	Two distinct interrogatories: 1. Product Identification 2. Sales Volume
4	One interrogatory	One interrogatory
5	One interrogatory	One interrogatory

6	One interrogatory	One interrogatory
7	One interrogatory	One interrogatory
8	Two distinct interrogatories: 1. Sales and profits 2. Identity of documents	One interrogatory
9	Five distinct interrogatories: 1. Commercial success 2. Long-felt need 3. Awards/prizes received 4. Praise 5. Identity of documents	Two distinct interrogatories: 1. Commercial Success (as evidenced by Praise and Awards/Prizes Received) 2. Long-Felt Need
10	Three distinct interrogatories: 1. Identification of witnesses 2. Subject-matter of testimony 3. Identity of documents	One interrogatory
11	Six distinct interrogatories: 1. Description of design/development 2. Dates of design/development 3. Time between design/development and commercial production 4. Identity of versions of relevant products 5. Identity of persons 6. Identity of documents	One interrogatory
12	Ten distinct interrogatories: 1. Factual bases for non-infringement of the '842 Patent 2. Factual bases for non-infringement of the '840 Patent 3. Whether any features of the relevant products perform substantially the same functions as an element of the '842 Patent 4. Whether any features of the relevant products perform substantially the same functions as an element of the '840 Patent 5. Factual bases for any reliance on the prosecution history of the '842 Patent 6. Factual bases for any reliance on the prosecution history of the '840 Patent 7. Identity of persons re the '842 Patent 8. Identity of persons re the '840 Patent 9. Identity of documents re the '842 Patent 10. Identity of documents re the '840 Patent	Two distinct interrogatories: 1. All factual bases for non-infringement of the '842 Patent 2. All factual bases for non-infringement of the '840 Patent
TOTAL	**42 distinct interrogatories**	**17 distinct interrogatories**

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Page 4

Oplus believes that each interrogatory as drafted is properly limited to a single distinct interrogatory with appropriate subparts that do not seek information about discrete or separate subjects. However, in the interest of compromise, Oplus is willing to agree in accordance with the table above that its 12 interrogatories comprise 17 distinct interrogatories, well within the 25-interrogatory limit. Based on the foregoing, Oplus requests that VIZIO agree to Oplus' position.

II. VIZIO'S DEFICIENT RESPONSES TO OPLUS' REQUESTS FOR PRODUCTION OF DOCUMENTS

VIZIO appears to refuse to produce documents in response to Oplus' Requests for Production of Documents Numbers 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 17, 18, 19, 20, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, and 66. Or to state the same reality another way, VIZIO has indicated that it will only produce documents responsive to 11 requests out of 66.

VIZIO's objections are voluminous, unfounded and inflammatory ("'relating to de-interlacing' is vague, ambiguous, misleading and unintelligible"). What they are not, however, is illuminating as to the specific reasons for VIZIO's refusal to produce responsive documents and things (see, e.g., Fed.R.Civ.P. 34(b)(2)(C)). To the extent VIZIO believes that it is unable or unwilling to provide documents related to any particular request for production based on one of the several objections, please immediately specify the reason for the continued failure to produce so that the parties may meaningfully meet and confer to resolve any remaining disputes before Oplus seeks relief from the Court.

Given the generous amount of time VIZIO has been afforded to provide adequate responses to Oplus' discovery requests, we request immediate supplementation of VIZIO's responses to Oplus' First, Second and Third Sets of Interrogatories and VIZIO's responses to Oplus' First Set of Requests for Production as well as an accompanying supplemental document production. If VIZIO is unwilling or unable to provide the requested supplementations by Thursday, February 7, 2013, please provide a date and time when counsel will be made available to meet and confer next week.

Regards,

Gabriel I. Opatken

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VIA E-MAIL

September 18, 2012

Paul C. Gibbons, Esq.
Niro, Haller & Niro
181 West Madison, Suite 4600
Chicago, Illinois 6602-4515

Re: *Oplus Technologies, Ltd. v. VIZIO, Inc.* (Case No. CV12-5707 MRP (Ex))

Dear Mr. Gibbons:

We are writing concerning deficiencies in the infringement contentions that Oplus served on VIZIO on August 9, 2012 ("Infringement Contentions") with respect to asserted U.S. Patent Nos. 7,271,840 (the '840 Patent) and 6,239,842 (the '842 Patent). The court required Oplus to provide the Infringement Contentions to frame the parties' disputes, to frame the scope of discovery, and to enable the parties to ascertain where they differ as to the construction of the asserted claims. However, Oplus' Infringement Contentions are deficient in numerous aspects and frustrate these purposes.

The Infringement Contentions appear to be calculated to conceal Oplus' failure to comply with Rule 11 of the Federal Rules of Civil Procedure. Opus repeatedly characterizes and applies claim language in a manner that is inconsistent with the language itself and makes a number of unsupported, illogical, and unwarranted inferences from publicly available product literature in order to shield its lack of evidence.

As detailed below, the Infringement Contentions are ambiguous and inconsistent as to the particular technologies that Oplus contends are infringing. For example, with respect to the '842 Patent, Oplus appears to allege at various points that any product using "Silicon Optix HQV technology"--which refers to a suite of technologies-- is infringing, while at other points Oplus appears to allege that only those products which include "pixel-based motion adaptive de-interlacing" are alleged to infringe.

The Infringement Contentions are similarly ambiguous and inconsistent with respect to the '840 Patent. Oplus appears at various points to allege that any product using "Faroudja DCDi" technology is infringing, but at other points appears to allege that only those Faroudja DCDi products which feature "motion adaptive noise reduction" are infringing. Further, Oplus appears to allege that any product using "MediaTek motion adaptive de-interlacing" infringes the '840 Patent, but elsewhere suggests that only those products using MediaTek motion adaptive

de-interlacing with 3:2 pull down detection are infringing. It is unclear whether Oplus contends that MediaTek motion adaptive de-interlacing *alone* is infringing, that 3:2 pull down detection *alone* is infringing, or that it is only a combination of MediaTek motion adaptive de-interlacing and 3:2 pull down detection that is infringing. Please clarify.

The Infringement Contentions also fail to identify the particular steps and sequences of calculations carried out by the accused products which Oplus contends are infringing. The contentions are most egregious with respect to the '840 Patent, as Oplus has inconsistently interpreted and applied its limitations to the Faroudja DCDi products and the MediaTek MDDi products. With respect to the MediaTek MDDi products, Oplus has done little more than parrot the claim language and broadly assert (without any support) that any product that performs 3:2 deinterlacing must inherently and necessarily perform the detailed calculations called for by claim 56 of the '840 Patent. This assertion is untenable.

In order to enable VIZIO to ascertain the true scope of Oplus' infringement contentions and determine which claim terms are likely to have disputed meanings in advance of the upcoming deadline for identifying them, we request that Oplus supplement its Infringement Contentions no later than September 26, 2012. If Oplus is unwilling or unable to amend the Infringement Contentions to address the issues raised herein, please provide dates and times this week when you or someone from your team will be available to meet and confer with us so we may seek relief from the Court.

I. Oplus' Direct Infringement Allegations

Oplus asserts that VIZIO has directly infringed the asserted claims under 35 U.S.C. § 271(a), but does not identify the alleged acts of infringement. Infringement Contentions at 2. Each of the asserted claims is a method claim that can only be infringed by performing each step, either literally or by equivalents. Nevertheless, the table on page 2 of the Infringement Contentions lists each act set forth in Section 271(a) ("made, used, sold, offered for sale, and/or imported"). The mere manufacture, sale, offer for sale and/or importation of a product cannot itself constitute infringement of a method claim. Therefore, please clarify which of the Section 271(a) acts Oplus contends VIZIO has committed and the basis for the contention.

II. Oplus' '842 Patent Infringement Allegations

A. Silicon Optix HQV Technology

Oplus apparently contends that all televisions and/or displays that "incorporat[e] Silicon Optix HQV technology" infringe the asserted claims of the '842 Patent. Infringement Contentions at 2. Please confirm whether that is the case, and please explain the meaning that Oplus ascribes to "Silicon Optix HQV technology" when using it in the Infringement Contentions.

To the extent that Oplus contends that the use of "Silicon Optix HQV technology" infringes its patents, its contentions fail to clearly identify which particular aspects of the technology are allegedly infringing or how they individually relate to the limitations of the

asserted claims. For example, page 2 of Exhibit A to the Infringement Contentions states that "HQV is a technology ***suite*** that performs many video error correction and video enhancement processes, including a pixel-based motion adaptive de-interlacing process." Infringement Contentions, Exh. A at 2 (emphasis added). However, Oplus fails to identify which aspects of the technology suite are at issue.

There are several areas of ambiguity in Oplus' application of its claims to "Silicon Optix HQV Technology." For example, is it Oplus' contention that any "pixel-based motion adaptive de-interlacing technology" is covered by the asserted '842 Patent claims? Infringement Contentions, Exh. A at 2. Is it Oplus' contention that the unspecified "video error correction and video enhancement processes" which comprise part of the HQV technology "suite" infringe the asserted '842 Patent claims? Infringement Contentions, Exh. A at 2. Please clarify.

Element (b) of claim 7 of the '842 Patent reads as follows:

> evaluating logical operations of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor'.

Infringement Contentions, Exh. A at 3. Oplus characterizes this claim element inconsistently with the claim language and states that "This element requires that the missing pixels are identified through averaging." Infringement Contentions, Exh. A at 3. To the extent that is Oplus' interpretation of the claim, its application of the claim reveals that it has no basis for asserting that the alleged "averaging" is used in the accused products. Instead, Oplus merely asserts that the accused products satisfy this limitation because "HQV's processes must take a multitude of potential values to fill in for missing current pixels and perform logical operations upon them to determine the best fit value in light of the motion present." Infringement Contentions, Exh. A at 3.

Please clarify the particular "evaluating" step that Oplus contends the accused products perform. Is it Oplus' contention that element (b) is met only by methods in which "missing pixels are identified through averaging"? Alternatively, does Oplus contend that element (b) is met by "processes [that] take a multitude of potential values to fill in for the missing pixels and perform logical operations upon them to determine the best fit value in light of the motion present" regardless of whether averaging is used? The corresponding element of claim 14 raises similar issues. Infringement Contentions, Exh. A at 9.

In addition, Oplus identifies "'Second Stage' Diagonal Interpolation" as a technique that somehow relates to element (b) of claim 7 and the corresponding element of claim 14.

Infringement Contentions, Exh. A at 4 and 9. It is not clear whether or how this relates to the asserted claims. Please explain how this process allegedly demonstrates the performance of the "evaluating" limitations of claims 7 and 14. Moreover, Oplus itself states that "This operation is called 'second-stage' diagonal interpolation because it's performed ***after*** de-interlacing . . . " and that "diagonal interpolation is ***independent*** of the de-interlacing process . . . ." Infringement Contentions, Exh. A at 4 and 10 (emphasis added). If second stage diagonal interpolation is performed independently of and after de-interlacing, it would appear to be irrelevant to the asserted claims, each of which is specifically directed to "A method for de-interlacing . . . ."

B. MediaTek MDDi Motion Adaptive Deinterlacing Technology

Oplus apparently contends that all televisions and displays that "incorporat[e] MediaTek motion adaptive deinterlacing technology" infringe the asserted claims of the '842 Patent. Infringement Contentions at 2. Please confirm whether that is the case and provide the meaning that Oplus ascribes to the phrase "MediaTek motion adaptive deinterlacing technology" when using the phrase in its Infringement Contentions. Oplus' infringement contentions are nevertheless ambiguous and confusing as to the specific aspects of the MDDi motion adaptive de-interlacing technology that it contends infringe the asserted '842 Patent claims or how those aspects relate to the specific limitations of the '842 Patent.

Based on the articulation of its contentions, it appears that Oplus is taking the position that any "motion adaptive de-interlacing technology" infringes the asserted '842 Patent claims. Please confirm whether that is the case. If it is not the case, please identify the specific aspects of the MediaTek MDDI motion adaptive de-interlacing technology that relate to the various claim limitations. Also, none of the cited exhibits indicate that the MediaTek de-interlacing technology is "pixel-based." Please clarify whether Oplus contends that it is pixel-based, and if so, identify the basis of its allegations.

In support of its allegations that VIZIO's accused products practice limitation (b) of claim 7 and the corresponding limitation of claim 14, Oplus cites two patents that it apparently contends are owned by MediaTek: U.S. Patent No. 7,286,186 (the "'186 Patent") and 6,456,329 (the "'329 Patent"). According to U.S. Patent & Trademark Office assignment records, MediaTek, Inc. has been assigned in excess of 2400 U.S. patents and/or patent applications. Therefore, please specify the basis on which Oplus has concluded that these two specific patents are practiced by the accused products. Please also specify the particular methods disclosed in the patents which Oplus contends are practiced in the accused products. For example, the '186 Patent discloses a method comprising calculating pixel intensity differences for a variety of pixel pairs, comparing the differences to thresholds, and then performing a logical "OR" operation to determine if motion is present. *See* '186 Patent at 5:30-6:35 and FIG. 8. Does Oplus contend that this method satisfies element (b) of claim 7 and the corresponding limitation of claim 14?

Oplus' citation of the '329 Patent is even more puzzling. Oplus asserts that "The MDDi algorithm analyzes pixels from multiple fields, comparing values of pixels at similar spatial locations but different times, and makes interpolations using averages of known values. " Infringement Contentions, Exh. C at 9. However, the '329 Patent does not compare temporal fields to perform de-interlacing. Instead, the disclosed method filters each spatial field vertically

and horizontally and then uses the filtered fields to generate a de-interlaced frame. Nor does it involve performing logical operations. What particular step in the '329 Patent does Oplus contend is practiced by the accused products, and how does that step make any use of fields that are temporally adjacent a given spatial field to de-interlace the spatial field?

III. Oplus' '840 Patent Infringement Contentions

A. Faroudja DCDi Technology

1. Scope of "Faroudja DCDi Technology" and Allegedly Infringing Components Thereof

Oplus apparently contends that all televisions or displays that use "Faroudja DCDi Technology" infringe the asserted claims of the '840 Patent. Infringement Contentions at 2. Please confirm whether that is the case. To the extent it is, Oplus' Infringement Contentions are nevertheless ambiguous as to the meaning Oplus ascribes to the phrase "Faroudja DCDi Technology." For example, Exhibit 24 to Oplus' Infringement Contentions references "Faroudja DCDi Cinema". According to the document, "Directional correlational deinterlacing (DCDi)" is a component of "Faroudja DCDi Cinema." Does Oplus contend that Faroudja's "Directional correctional deinterlacing" *alone* infringes the asserted '840 patent claims" or is the entire "Faroudja DCDi Cinema" that allegedly infringes the claims?

2. Motion Adaptive Noise Reduction

Exhibit 24 mentions several other technologies as falling under the umbrella of "Faroudja DCDi Cinema," including "Film mode detection technology," "TrueLife enhancement," and "Motion adaptive noise reduction." Oplus' claim charts mention "motion adaptive noise reduction." However, does it contend that all products that use "Faroudja DCDi" also use "motion adaptive noise reduction"? Does it contend that any product using "motion adaptive noise reduction" infringes the asserted '840 Patent claims? If not, please identify the specific features of the motion adaptive noise reduction technology that are allegedly used in the accused products and how they relate to the asserted claim limitations.

We note further that Oplus apparently contends that "determining [the] entropy of a pixel of a real time streaming digital video image signal . . . is an aspect of a motion adaptive noise reduction process." Infringement Contentions, Exhibit B at 7. Is it Oplus' contention that any motion adaptive noise reduction process ***necessarily*** requires a determination of pixel entropy? If so, what support does Oplus have for this contention?

Moreover, what is the basis for Oplus' assertion that the accused products include motion adaptive noise reduction? The cited product literature does not reference it. Nor does any of it indicate that the entire suite of technologies comprising "Faroudja DCDi Cinema" (as set forth in Exhibit 24) is used in any of the accused products. We further note that Oplus cites a data sheet for an "FLI2300 Digital Video Format Converter" in its Infringement Contentions. Infringement Contentions, Exh. B at 8 (citing Exh. 24). However, Oplus cites no evidence that this particular converter is used in any of the accused products.

Oplus appears to be falsely equating references to "Faroudja DCDi" in the accused product literature with "motion adaptive noise reduction". However, Exhibit 22 expressly belies that contention by first discussing "motion adaptive noise reduction" and then describing "Directional Correlational Deinterlacing (DCDi^{TM})" as "[a]nother proprietary feature." Therefore, please state the basis for Oplus' assertion that the accused products use the FLI2300 Digital Video Format Converter or that they otherwise include "motion adaptive noise reduction" simply because certain product literature references the term "Faroudja DCDi." In addition, the distinguishing use of "Faroudja DCDi" and "motion adaptive noise reduction" in Exhibit 24 suggests that the use of Faroudja DCDi *alone* cannot possibly infringe the asserted claims. As this suggestion is contrary to the position taken by Oplus on page 2 of its Infringement Contentions, please clarify Oplus' position.

3. <u>Claim 56 Preamble and steps (a) and (b)</u>

Next, Oplus asserts that "Vizio's Televisions . . . perform[] [their] edits in real time, and any error correction, performed must, by nature, be automatic." Infringement Contentions, Exhibit B at 8. Oplus fails to provide any examples of particular "errors" that have allegedly been corrected by the accused products. Please identify them.

Claim 56 recites the step "(a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval." Infringement Contentions, Exh. B at 9. Oplus apparently contends that the accused products meet this limitation because they allegedly use motion adaptive noise reduction. *Id.* As explained above, this contention is not supported by any of the product literature cited by Oplus. Therefore, please state the basis for Oplus' contention.

Step (b) of claim 56 recites "assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel . . . in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels . . . said three consecutive fields being a previous field, a next field, and a current field." Infringement Contentions, Exh. B at 9. Oplus concedes that "This element requires that the video error correction method select an area . . . of a field, then also establish identical areas in the field before and the field after." *Id.* However, Oplus does not even allege that this limitation is met, and at most, states that the accused products use ***<u>one</u>*** temporal field:

> The Motion Adaptive Noise Reduction of the Genesis chipsets utilized by the Vizio Televisions must consider ***<u>a temporal field</u>*** to detect motion with any accuracy, which is further indicated by the fact that the technology is based on temporal noise reduction filtering. Only through considering a temporally related portion of time may motion by properly detected to ensure that error correction does not affect motion to create the smearing or ghosting that Genesis warns of above.

Infringement Contentions, Exh. B at 9 (emphasis added). Thus, please identify the basis, if any, for alleging that the accused products use two temporal fields in the manner specified by step (b).

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With respect to step (b), Oplus further cites a third party website's characterization of Faroudja DCDi technology. Infringement Contentions, Exh. 25. However, the cited description of the technology says nothing about the use of temporal fields. Please explain the relevance of Exhibit 25 to this claim limitation.

4. Step(c)

Step (c) of claim 56 recites "determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels . . . ." Oplus attempts to rewrite this limitation by asserting that it merely "requires the pixels of the temporal fields to be compared to detect pixels affected by noise, which is a form of video error that is based on the entropy of the data." Infringement Contentions, Exh. B at 10. The claim expressly requires "determining the entropy," yet Oplus provides no formula or method by which an entropy value is allegedly calculated by the accused products. Does Oplus contend that this limitation is met simply by comparing pixels of temporal fields? Does Oplus contend that an accused product need not calculate an entropy value to satisfy this limitation? Please clarify.

With respect to this same limitation, we note that Oplus inconsistently goes on to state that the accused products "measure the value of other pixels in the same spatial neighborhood across multiple temporally associated ***frames***" rather than "fields." *Id.* at 10-11. Does Oplus contend that this limitation is met by comparing pixel across multiple frames rather than fields?

5. Step (c)(i)

Step (c)(i) of claim 56 recites "calculating values of pixel inter-local neighborhood local neighborhood parameters . . . whereby each said value of each said pixel inter-local neighborhood parameter represents a ***regional sum*** of local neighborhood ***weighted distances*** measured between said neighboring pixels . . . . " Infringement Contentions, Exh. B at 12 (emphasis added). Oplus attempts to rewrite this limitation by indicating that it merely requires that "the selected area of the fields are compared, detecting the changes that occur between each and to create a weighted change between each." *Id.* Oplus fails to identify the "weighted distances" that are allegedly used to create the claimed "inter-local neighborhood parameters" in the accused products. Please identify the distances and the nature of the weights that are allegedly used in the accused products. Also, please identify how, if at all, such weighted distances are allegedly used to create a "regional sum" in the accused products. We further note that none of the exhibits cited by Oplus indicate the calculation of either a "regional sum" or a "weighted distance." As explained below, Oplus characterizes this limitation inconsistently as between the Faroudja DCDi and MediaTek MDDi products.[1] Thus, we question whether Oplus had a proper basis under Rule 11 for asserting that this limitation is met by the accused products.

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[1] VIZIO does not agree with the manner in which Oplus uses the phrases "Faroudja DCDi" or MediaTek MDDi" or with Oplus' implicit assertion that they connote a defined set of video processing algorithms.

6. Step (c)(ii)

Step (c)(ii) of claim 56 recites "calculating a value of a ***virtual-pixel intra-local neighborhood parameter***, for each said virtual pixel in said current field." Infringement Contentions, Exh. B at 14 (emphasis added). Again, Oplus ignores the language of the claim and rewrites it, stating that "This element requires a value to be developed for what a pixel determined to be affected by noise should be in the current field, based on the weighted change established." *Id.* Both the specification and claim 65 describe the "virtual-pixel intra-local neighborhood parameter" in a manner that cannot be reconciled with Oplus' characterization of this limitation:

> In sub-step (ii) of Step (c), there is calculating a value of a virtual-pixel intra-local neighborhood parameter, herein, referred to as virtual-pixel intra-local neighborhood parameter, VIRT, for each virtual pixel, V(i,j), in the current field, F(t). ***The value of the virtual-pixel intra-local neighborhood parameter, VIRT, represents a regional sum of the intra-local neighborhood weighted distances*** measured between pixels located in horizontal lines i-1, i-2, . . . , i-L, of the first local neighborhood of each virtual pixel, V(i,j), consisting of (L)(2M+1) neighboring pixels, and pixels located in horizontal lines i+1, i+1, i+2, . . . , i+L, within the same first local neighborhood of the same virtual pixel, V(i,j), consisting of (L)(2M+1) neighboring pixels, where L is a positive integer greater than zero, that is, 1,2,3, ...

The '840 Patent at 13:65-14:11 (emphasis added). *See also*, the '840 Patent at claim 65. While the patent does state that this parameter can be used to determine how to interpolate pixel data to arrive at values for missing pixels (the '840 Patent at 17:45-55), that does not mean that any method that uses interpolation to arrived at a missing value necessarily relies upon the calculation of a "virtual-pixel intra-local neighborhood parameter." The assumption that this element is met by any method that performs a "calculation . . . to determine what the proper value of a pixel affected by noise should be" is unsupported and unwarranted. Infringement Contentions, Exh. B at 14. We further note that Oplus has interpreted and applied this limitation inconsistently as between Faroudja DCDi and MediaTek MDDi products. Please identify the method by which this parameter is allegedly calculated in the accused products.

7. Step (c)(iii)

Step (c)(iii) of claim 56 requires "adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field." Infringement Contentions, Exh. B at 16. Oplus ignores the language of the claim and contends that "This element requires it to be established which pixels in each of the temporally related fields are affected by noise or other errors, to establish the level of entropy for that pixel." Infringement Contentions, Exh. B at 16. The element requires a specific calculation, i.e., adjusting a value of a pixel entropy counter. While the

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Nevertheless, the terms are used herein for purposes of distinguishing and classifying Oplus' infringement contentions.

counter may be used to assess the influence of noise on particular pixel values, it does not follow that any method which assesses the influence of noise necessarily involves making adjustments to a pixel entropy counter. Please identify how the "adjusting" step is allegedly carried out in the accused products and the nature of the alleged "pixel entropy counter."

8. Step (c)(iv)

Step (c)(iv) of claim 56 requires "calculating a value of the entropy of each said previous pixel . . ., each said next pixel . . . , and of each said virtual pixel . . . from said values of said pixel entropy counters of said pixels." Infringement Contentions, Exh. B at 18. Oplus ignores these requirements and states that "This element takes the conclusions from the above steps to establish the new, proper, value for any pixels in the current field affect [sic] by noise." *Id.* Oplus characterization of the claim is inconsistent with the language of the claim and the patent. The '840 Patent refers to "the degree or extent of randomness or disorder . . . as the entropy." The '840 Patent at 8:23-24. Step (c)(iv) requires calculating a value of the entropy for the previous, next, and virtual pixel, not (as Oplus indicates) calculating the new value for pixels affected by noise. While an entropy value may be used to calculate new values of pixels affected by noise, it does not follow that any method which calculates such new values necessarily does so by calculating the required entropy values.

Please identify the specific entropy calculations that Oplus contends are carried out by the accused products for each of the referenced pixels.

In addition, Oplus references "TrueLife Enhancement" and "Cross Color Suppression" technologies in its allegations concerning step (c)(iv). Please state the basis for Oplus' assertion that these technologies are used in the accused products, as well as the basis for its assertion that they "are based on temporal filtering." Infringement Contentions, Exh. B at 18. Please also explain how it is the use of such technologies evidences the calculating of entropies called for by this limitation.

B. MediaTek MDDi Motion Adaptive Deinterlacing

At the outset, we note that Oplus fails to identify any particular methods or method steps that the accused MediaTek MDDi products implement which satisfy the limitations of the asserted claims. Instead, Oplus repeatedly asserts that each step in claim 56--which spans nearly an entire column of the '840 Patent--***must*** be practiced because the accused products allegedly perform "3:2 deinterlacing." This assertion is completely unreasonable. If its claims were as broad as Oplus now contends, one would have certainly expected them to avoid the specific and detailed calculations that are recited. Moreover, these assertions are belied by the text of the '840 Patent which references a prior art patent (U.S. Patent No. 4,982,280) which disclosed a "three-to-two (3:2) film to video sequence mode detector . . ." The '840 Patent at 3:4-5.

1. Scope of "MediaTek Motion Adaptive Deinterlacing"

Page 2 of the Infringement Contentions indicates that "MediaTek Motion Adaptive Deinterlacing Technology" infringes the asserted claims of the '840 Patent. In contrast, Exhibit

D states that "MDDi Motion Adaptive Deinterlacing with 3:2 Pulldown Detection" infringes the asserted claims. Infringement Contentions, Exh. D at 1. Please clarify whether Oplus alleges that the use of motion adaptive deinterlacing alone, 3:2 pull down detection alone, or the combination of motion adaptive deinterlacing and 3:2 pull down detection infringes the '840 Patent.

2. <u>Claim 56 Preamble</u>

Oplus states that "In 3:2 deinterlacing, in order to determine if a pixel belongs to one field or another, i.e., to determine which field or frame it is related to, it is necessary to determine its entropy." Infringement Contentions, Exh. D at 1. Does Oplus contend that any method which performs deinterlacing on an interlaced field subjected to 3:2 pulldown necessarily involves a determination of pixel entropy? If so, please state the basis for this contention.

Oplus further states that "Interlaced video signals are subject to errors caused by real time editing of the video signal." Infringement Contentions, Exh. D at 1. Please identify any such errors that have occurred or which have allegedly been corrected by the accused products.

3. <u>Step (a)</u>

Oplus contends that the accused MediaTek MDDi products "use[] a predetermined time interval comprising 3 consecutive fields." Infringement Contentions, Exh. D at 2. The only support that Oplus cites for this proposition is U.S. Patent No. 7,286,186. However, Oplus fails to provide any basis for its implicit contention that the accused products practice this patent. Please provide Oplus' basis for this assertion.

Moreover, the '186 Patent does not concern entropy or noise calculations or 3:2 pull down. Please explain what the relevance of the patent is to the asserted claims.

4. <u>Step (c)</u>

Step (c) recites "determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel . . . ." Infringement Contentions, Exh. D at 3. Oplus asserts that this step must be performed in order to perform 3:2 deinterlacing. It further appears that Oplus contends--without any support--that steps (c)(i) to (c)(iv) are <u>**necessarily**</u> performed in any method of performing 3:2 deinterlacing. Please confirm whether that is, in fact, what Oplus contends and provide support for this contention.

5. <u>Step (c)(i)</u>

Step (c)(i) recites "calculating values of pixel inter-local neighborhood local neighborhood parameters . . . whereby each said value of each said pixel inter-local neighborhood parameter represents a <u>***regional sum***</u> of local neighborhood <u>***weighted distances***</u> measured between said neighboring pixels . . . . " Infringement Contentions, Exh. D at 3. (emphasis added). Oplus attempts to rewrite this limitation by stating that the parameters represent the "distance weighted sum relative to the virtual pixel." *Id.* A "distance weighted sum" is not a "regional sum of . . . weighted distances." Oplus' attempt to rewrite the claim is

improper. Oplus is also inconsistent in its interpretation and characterization of this limitation with respect to the accused products using Faroudja DCDi technology.

Moreover, Oplus fails to explain what the alleged "sum" is or how "distances" are used to weight it. Please clarify how the accused products allegedly calculate the claimed values such that they represent a regional sum of local neighborhood weighted distances.

Further, Oplus asserts, without any support, that "MDDi ***must determine*** the neighborhood parameters of each previous and next pixel neighborhoods from the previous and next fields in order to know or estimate which of the pixels are obtained from or belong to the same input image frame . . . ." Infringement Contentions, Exh. D at 3. Please provide the basis for this statement.

6. Step (c)(ii)

Step (c)(ii) of claim 56 recites "calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field." Infringement Contentions, Exh. D at 4 (emphasis added). It should first be noted that Oplus characterizes this limitation inconsistently with respect to the MDDi and Faroudja DCDi products. Moreover, Oplus provides no support for its assertion that this limitation is practiced by the accused products, instead asserting that it "must" occur "[i]n order to perform 3:2 deinterlacing . . . ." Infringement Contentions, Exh. D at 4. Please explain how the accused products allegedly calculate a value of the claimed parameter and identify Oplus' basis for such allegations.

7. Step (c)(iii)

Step (c)(iii) of claim 56 requires "adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field." Infringement Contentions, Exh. D at 4. Again, Oplus characterizes this element inconsistently with respect to the MDDi and Faroudja DCDi accused products. Oplus provides no explanation as to the nature of the alleged "pixel entropy counter" used by the accused products. Instead, it simply asserts that one must be present "In order for MDDi to determine or estimate which adjacent field pixel is most closely related to the virtual pixel." *Id.* Please explain the basis for Oplus' assertion that MDDi determines or estimates which adjacent field pixel is most closely related to the virtual pixel. Please also explain how it is that such a determination or estimate ***necessarily*** involves the use of a "pixel entropy counter" and identify the calculations allegedly performed by the accused products which Oplus contends constitute the counter.

8. Step (c)(iv)

Step (c)(iv) of claim 56 requires "calculating a value of the entropy of each said previous pixel . . ., each said next pixel . . . , and of each said virtual pixel . . . from said values of said pixel entropy counters of said pixels." Infringement Contentions, Exh. D at 4-5. As with steps (c)(i) to (c)(iii), Oplus characterizes this limitation inconsistently with respect to the MediaTek MDDi and Faroudja DCDi products. Moreover, Oplus does nothing more than reformulate the

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claim language without making any attempt to show any particular entropy calculations that the accused products allegedly carry out. Please identify the specific entropy calculations that Oplus contends are carried out by the accused products for each of the referenced pixels.

Please confirm that Oplus will amend its infringement contentions to address the foregoing deficiencies no later than September 26, 2012. Otherwise, please provide us with dates and times this week for a telephonic meet and confer.

Sincerely,

Steven R. Hansen, Esq.

Encl.

cc: Adrian M. Pruetz, Esq.
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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION; VIZIO, INC., Defendants.	CASE NO.: CV12- 5707 MRP (Ex) Hon. Judge Mariana R. Pfaelzer **DECLARATION OF CHARLES C. KOOLE IN SUPPORT OF DEFENDANT VIZIO, INC.'S SUPPLEMENTAL MEMORANDUM IN OPPOSITION TO OPLUS' MOTION TO COMPEL PRODUCTION OF DOCUMENTS** DATE: April 15, 2013 TIME: 11:00 a.m. PLACE: Courtroom 12

Glaser Weil Fink Jacobs Howard Avchen & Shapiro LLP

DECLARATION OF CHARLES C. KOOLE

I, Charles C. Koole, declare as follows:

1. I am an associate attorney in the law firm of Glaser Weil Fink Jacobs Howard Avchen & Shapiro LLP and I am an attorney of record for Defendant VIZIO, Inc. ("VIZIO") in the following action pending in the Central District of California: *Oplus Technologies, Ltd. v. Sears Holdings Corporation, et al.*, Case No. 2:12-cv-05707-MRP (Ex) (C.D. Cal.). I make this declaration on personal knowledge, and if called as a witness, I could and would testify competently thereto.

2. Attached hereto as Exhibit A is a true and correct copy of a letter sent to Oplus counsel on September 18, 2012 regarding deficiencies in the infringement contentions that Oplus served on VIZIO on August 9, 2012.

3. Attached hereto as Exhibit B is a true and correct copy of the infringement contentions that Oplus served on VIZIO on August 9, 2012.

4. Attached hereto as Exhibit C is a true and correct copy of the Declaration of Kenneth Lowe, Vice President of VIZIO, which was filed concurrently with VIZIO's Motion to Sever and Transfer Claims Against VIZIO and Stay Claims Against Sears on March 20, 2012.

5. Attached hereto as Exhibit D is a true and correct copy of relevant excerpts of Oplus' First Set of Requests for Production of Documents to VIZIO, Inc and Oplus' First Set of Interrogatories (Nos. 1-3).

6. On March 20, 2013, Oplus counsel proposed the following revision, in underline below, to the draft protective order:

> (iv) a listing of all cases in which the person has served as an expert over the past ten (10) years <u>on the subjects of televisions or television components</u>, including an identification of the party for which he or she provided expert services;

On March 28, 2013, Oplus counsel proposed the following addition to the provision of the draft protective order concerning the disclosure of experts' prior engagements:

Notwithstanding the foregoing, if any of the information required under this provision is subject to a confidentiality obligation between the outside expert or consultant on the one hand and a third-party on the other hand, then the a outside expert or consultant shall disclose that a confidential relationship exists and provide whatever information can be disclosed without violating any confidentiality agreements. The Parties agree to meet and confer in good faith to resolve any disputes before seeking relief from the Court.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge and belief.

Executed this 1st day of April 2013 in Los Angeles, California.

__/s/ Charles C. Koole______________
Charles C. Koole

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IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA
WESTERN DIVISION

OPLUS TECHNOLOGIES, LTD., Plaintiff, v. SEARS HOLDINGS CORPORATION and VIZIO, INC., Defendants.	Case No. CV12-5707 MRP (Ex) *Assigned to the Honorable Mariana R. Pfaelzer* **PLAINTIFF'S INITIAL INFRINGEMENT CONTENTIONS** **JURY TRIAL DEMANDED**

Pursuant to the parties' agreed Supplemental 26(f) Report (Dkt. No. 75), Plaintiff Oplus Technologies, Ltd. ("Oplus") hereby submits its Initial Infringement Contentions to Vizio, Inc. ("Vizio"). Oplus has prepared these Initial Infringement Contentions with the publically available information describing the operation of the accused products and technology and without the benefit of discovery, and thereby reserves the right to supplement and/or amend these Initial Infringement Contentions. To the extent that Oplus' position changes upon discovery in this action, Oplus will amend these infringement contentions.

Oplus identifies the following Vizio products as infringing:

Product	**Direct Infringement Contentions (35 U.S.C. §271(a), "made, used, sold, offered for sale, and/or imported" by Vizio or its retailers or its end customers)**
Televisions and/or displays incorporating Silicon Optix HQV technology, including, but not limited to, VP505XVT, VP504F, VP605F model televisions.	U.S. Patent No. 6,239,842, Claims 7, 8, 9, 14, 15
Televisions and/or displays incorporating Faroudja DCDi technology, including, but not limited to, P50HDTV10A, VM60P, GV46L0, RP56, L13 and JV50P model televisions.	U.S. Patent No. 7,271,840, Claims 56, 57, 58, 59, 62
Televisions and/or displays incorporating MediaTek motion adaptive deinterlacing technology (e.g., MediaTek MT535X, MT538X and MT820X video signal processing chips with MDDi), including, but not limited to, L42HDTV10A, GV42L HDTV, L37HDTV, VW46L FHDTV10A, and P42HDTV10A model televisions.	U.S. Patent No. 6,239,842, Claims 7, 8, 9, 14, 15; and U.S. Patent No. 7,271,840, Claims 56, 57, 58, 59, 62

Attached as Exhibit A is a representative claim chart for the VP505XVT, which represents all Vizio televisions and/or displays that incorporate HQV technology. Attached as Exhibit B is a representative claim chart for the P50HDTV10A, which represents all Vizio televisions and/or displays that incorporate Faroudja DCDi technology. Attached as Exhibit C is a representative claim chart for the ‘842 Patent for all Vizio televisions and/or displays that incorporate MediaTek MDDi image processing technology. Attached as Exhibit D is a representative claim chart for the ‘840 Patent for all Vizio televisions and/or displays that incorporate MediaTek MDDi image processing technology. Oplus has endeavored to identify all infringing Vizio television and display models possible through publically available information, but anticipates that discovery will identify additional television or display models than those identified which incorporate the identified technology. Oplus will thus amend these infringement contentions if further infringing models are identified during discovery.

Oplus asserts that Vizio has (a) directly infringed and continues to directly infringe claims 7, 8, 9, 14 and 15 of the ‘842 patent, claims 56, 57, 58, 59, and 62 of the ‘840 patent within the meaning of 35 U.S.C. §271(a); (b) indirectly infringed and continues to indirectly infringe the same asserted claims of the patents-in-suit under 35 U.S.C. 35 U.S.C. §271(b) by knowingly and actively inducing infringement by others of those claims; and (c) further indirectly infringed and continues to directly infringe the same claims of the patents-in-suit under 35 U.S.C. 35 U.S.C. §271(c) by contributing to the infringement of others.

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As for inducement and contributory infringement, Oplus identifies that Vizio or its retailers (i.e., such as Sears, Costco, or Sam's Club) or its end customers directly infringe pursuant to 35 U.S.C. §271(a) by performing each step of the asserted claims during standard operation of the Vizio television sets, as described in its user manuals and quick start guides. Vizio's inducing acts pursuant to 35 U.S.C. §271(b) include, *inter alia*, its advertising and announcing the superiority of the accused products based upon the infringing technology and instructing through its user manuals on how to perform the infringing method. See, e.g., Exhibit 1 (VP505XVT User Manual); Exhibit 2 ("To ensure smooth, crisp, clean, and more vibrant images, VIZIO integrated the Silicon Optix's REON HQV processing into the VP505XVT. This advanced technology brings out even the finest details with both Standard Definition (SD) and High Definition (HD) sources. Rendered colors are more natural, showing true color tones as they were intended. Moreover, Silicon Optix HQV's advanced noise reduction removes noise and artifacts caused by signal compression from cable and satellite providers. Since the HQV's REON chip can process two full channels of HD or SD channels, this allows users to achieve full resolution with picture-in-picture images."); Exhibit 3 ("these plasma displays offer great visual experience in high-definition flat panel technology"); Exhibit 12 (GV42L User Manual); Exhibit 13 (P50HDTV10A User Manual); Exhibit 14 ("DCDi by Faroudja low angle de-interlacing processing for superior video quality"). Additionally, Vizio contributes to the infringement of others pursuant to 35 U.S.C. §271(c) through, among other things, its acts of making, using, marketing, distributing, providing, testing, configuring, selling and/or

offering to sell in the United States and importing into the United States products with video deinterlacing technology. The accused products further lack any substantial noninfringing use.

Oplus reserves the right to amend these Initial Infringement Contentions.

Respectfully submitted,

/s/ Paul C. Gibbons

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Attorneys for Oplus Technologies, Ltd.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on August 9, 2012 the foregoing

PLAINTIFF'S INITIAL INFRINGEMENT CONTENTIONS

was filed with the Clerk of Court using the CM/ECF system, which will then send a notification of such filing to the following counsel of record:

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I certify that all parties in this case are represented by counsel who are CM/ECF participants.

/s/ Paul C. Gibbons
Attorneys for Oplus Technologies, Ltd.

EXHIBIT A
Infringement Chart
U.S. Patent No. 6,239,842
Vizio Televisions or Displays with HQV, Including VP505XVT, VP504F, and VP605F

Vizio (or its customers or retailers) have infringed claims 7, 8, 9, 14, 15 of U.S. Patent No. 6,239,842 ("the '842 patent") within the meaning of 35 U.S.C. 271(a) by making, using, selling, offering for sale, or importing in to the United States televisions or displays incorporating HQV technology, including at least Vizio's VP505XVT, VP504F, and VP605F. (See **Exhibits 2** and **6**). As described, Vizio also induces and contributes to infringement within the meaning of 35 U.S.C. 271(b) and 35 U.S.C. 271(c). See manuals for Vizio TVs, e.g. VP505XVT user manual pages, (**Exhibit 1);** VP504F user manual pages **(Exhibit 7)**. This claim chart is meant to be exemplary of infringement by any Vizio television incorporating HQV technology. As discovery has just begun, Oplus reserves the right to add additional claims and/or products.

Claim	Infringement by Vizio Televisions or Displays Incorporating HQV
Claim 7	
A method for de-interlacing an interlaced video format, the method comprising the steps of:	Vizio televisions with HQV, including Vizio's VP505XVT televisions, make use of HQV technology to give them an advantage in video quality. From the Press Release accessed on 11-27-2011 and August 2, 2012 at http://www.noydcom.com/press_release/vizio/XVT/VIZIO_XVT_PR_FNL.pdf (**Exhibit 2**): **VP505XVT FULL 1080p Plasma with SILICON OPTIX HQV (Hollywood Quality Video) Processing** VIZIO jumps deeper into Full High-Definition 1080p plasma performance with a bang to capture the imagination of even the most discerning consumers with the 50" VIZIO VP505XVT. Plasma TVs are the preferred choice for superior color, higher contrast ratios, longer panel life and fast refresh rates. To ensure smooth, crisp, clean, and more vibrant images, VIZIO integrated the Silicon Optix's REON HQV processing into the VP505XVT. This advanced technology brings out even the finest details with both Standard Definition (SD) and High Definition (HD) sources. Rendered colors are more natural, showing true color tones as they were intended. Moreover, Silicon Optix HQV's advanced noise reduction removes noise and artifacts caused by signal compression from cable and satellite providers. Since the HQV's REON chip can process two full channels of HD or SD channels, this allows users to achieve full resolution with picture-in-picture images.

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Vizio Televisions or Displays with HQV, Including VP505XVT, VP504F, and VP605F

	(See also, Exhibit 6). Vizio further points out how this product is being sold through retailers such as Sears, Costco, and Sam's Club: Available through traditional consumer electronics retailers such as Circuit City and Sears and Club retailers like Costco and Sam's Club, the new VIZIO VP505XVT will ship in July with an estimated selling price of $1699.99. http://www.noydcom.com/press_release/vizio/XVT/VIZIO_XVT_PR_FNL.pdf (**Exhibit 2**) Hollywood Quality Video (HQV) advertises on their website this model makes use of such technology. From HQV's website's products page assessed on 11-27-2011 and August 2, 2012 at http://www.hqv.com/index.cfm?page=products.displays (**Exhibit 3**) Vizio  The Vizio VP505XVT products feature the finest technology available today, Including HQV® Hollywood Quality Video™ processing working with full high definition 1080p resolution, these plasma displays offer great visual experience in high-definition flat panel technology. Whether it's High Definition, Standard Definition, or EDTV, the signals are reproduced with amazing results. VP505XTV 50" Plasma TV HQV is a technology suite that performs many video error correction and video enhancement processes, including a pixel-based motion adaptive de-interlacing process. This process is shown on HQV's website's de-interlacing technology page accessed on 1-20-2011 and August 2, 2012 at http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**):

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	IDT HQV approach (pixel-based motion adaptive) HQV processing represents the most advanced de-interlacing technique available: a true pixel-based motion-adaptive approach. With HQV processing, motion is identified at the pixel level rather than the frame level. While it is mathematically impossible to avoid discarding pixels in motion during de-interlacing, HQV processing is careful to discard only the pixels that would cause combing artifacts. Everything else is displayed with full resolution. Pixel-based motion-adaptive de-interlacing avoids artifacts in moving objects and preserves full resolution of non-moving portions of the screen even if neighboring pixels are in motion.
(a) receiving the interlaced video format feature a sequence of fields of pixels to be de-interlaced;	HQV technology includes de-interlacing video, and states that 4 fields are used "to implement a true per-pixel motion-adaptive deinterlacer." http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**):
(b) evaluating logical operations of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of	This element requires that the missing pixels are identified through averaging, creating a multitude of various potential values to calculate off of using any applicable logical operation. This allows a great level of flexibility on calculating ideal formulas and values to utilize to de-interlace the video correcting for common errors that will result from a blind application of the temporal field's pixel values to the current field's missing pixels. Vizio televisions using HQV technology utilize HQV's pixel-based motion adaptive de-interlacing technique to try to correct these sorts of common errors as well. HQV notes that its pixel-based motion adaptive process for de-interlacing discards only pixels that would cause artifacts by analyzing movement at the pixel level across temporally related fields to measure the movement. In other words, HQV's processes must take a multitude of potential values to fill in for the missing current pixels and perform logical operations upon them to determine the best fit value in light of the motion present.

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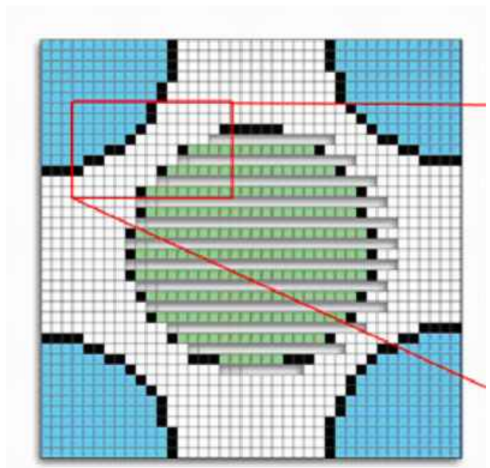
said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality fo constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor'; and	As stated by Jed Deame, a co-founder and General Manager of Teranex/SiliconOptix: HQV processing represents the most advanced de-interlacing technique available: a true pixel-based motion-adaptive approach. With HQV processing, motion is identified at the pixel level rather than the frame level. While it is mathematically impossible to avoid discarding pixels in motion during de-interlacing, HQV processing is careful to discard only the pixels that would cause combing artifacts. Everything else is displayed with full resolution.  * * * "Second Stage" Diagonal Interpolation To recover some of the detail lost in the areas in motion, HQV processing implements a multi-direction diagonal filter that reconstructs some of the lost data at the edges of moving objects, filtering out any "jaggies." This operation is called "second-stage" diagonal interpolation because it's performed after the deinterlacing, which is the first stage of processing. Since diagonal interpolation is independent of the de-interlacing process, competitors have used similar algorithms with their frame-based de-interlacing approaches.

EXHIBIT A
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	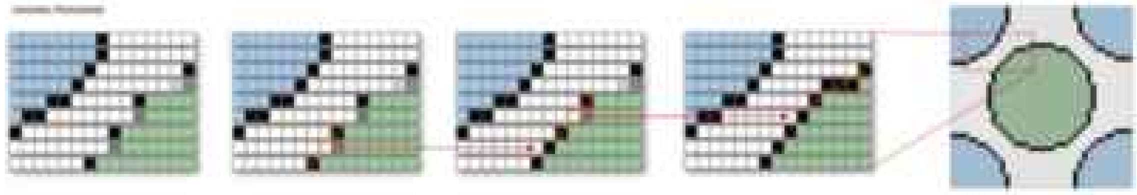 http://www.digitalsalesgroup.com/directlines/onkyo/newsletters/HQV_processing_for_Reon.pdf **(Exhibit 5)**
(c) deciding upon assignment of values to missing spatial pixels according to results of said logical operations	As shown above, Vizio televisions using HQV must decide upon assignment of values as dictated by the logical operations shown and discussed above, both through the initial step of selectively employing temporal placement of pixels from prior fields of the image (e.g., where motion is not detected), and through the step of assignment of values based upon, e.g., diagonal interpolation to fill in detail to replace values that might otherwise create feathering or combing artifacts.
Claim 8	
The method of claim 7 , wherein said sequence of fields of pixels to be de-interlaced features a current spatial field featuring missing spatial pixels and said spatial pixels with known values located in said sequence of aid fields, and at least one temporal field featuring said temporal pixels with said known values located in said sequence of said fields.	Because the interlaced vide3o signals which the Vizio televisions with HQV all meet video standards (e.g. NTSC, 1080i HDTV) the sequence of fields of pixels to be deinterlaced features a current spatial field featuring missing spatial pixels (i.e. the missing pixels of the missing scan lines of video) and spatial pixels with known values (i.e. the included pixels of the included scan lines of video which pixels have known values) and at least one temporal field (e.g. the immediately previous or immediately past field) with temporal pixels with known values (i.e. the included pixels of the included scan lines of video which pixels have known values. See http://www.digitalsalesgroup.com/directlines/onkyo/newsletters/HQV_processing_for_Reon.pdf **(Exhibit 5)** ("HQV processing uses a per-pixel motion-adaptive and noise-adaptive temporal filter to avoid the artificial appearance and artifacts associated with conventional noise filters. To preserve maximum detail, moving pixels do not undergo unnecessary noise processing. In static areas, the strength of noise reduction is determined on a per-pixel basis, depending on the level of noise in the surrounding pixels as well as in previous frames, allowing the filter to adapt to the amount of noise in the image at any given time.").
Claim 9	
The method of claim 7, wherein said one temporal field featuring	In order for the HQV technology to perform 3:2 pulldown deinterlacing it is necessary to utilize both the immediate previous and immediate next temporal field in order that the 3 field

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said temporal pixels with said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields.	exposure of one film frame may be distinguished from 2 field and 1 field exposures thereby ensuring that at least one of the group of immediate previous and immediate next temporal field is utilized as said one temporal field. See http://www.digitalsalesgroup.com/directlines/onkyo/newsletters/HQV_processing_for_Reon.pdf **(Exhibit 5)** ("HQV processing uses a per-pixel motion-adaptive and noise-adaptive temporal filter to avoid the artificial appearance and artifacts associated with conventional noise filters. To preserve maximum detail, moving pixels do not undergo unnecessary noise processing. In static areas, the strength of noise reduction is determined on a per-pixel basis, depending on the level of noise in the surrounding pixels as well as in previous frames, allowing the filter to adapt to the amount of noise in the image at any given time.").
Claim 14	
A method for de-interlacing an interlaced video format, the method comprising the steps of:	Vizio televisions with HQV, including Vizio's VP505XVT televisions, make use of HQV technology to give them an advantage in video quality. From the Press Release accessed on 11-27-2011 and August 2, 2012 at http://www.noydcom.com/press_release/vizio/XVT/VIZIO_XVT_PR_FNL.pdf (**Exhibit 2**): **VP505XVT FULL 1080p Plasma with SILICON OPTIX HQV (Hollywood Quality Video) Processing** VIZIO jumps deeper into Full High-Definition 1080p plasma performance with a bang to capture the imagination of even the most discerning consumers with the 50" VIZIO VP505XVT. Plasma TVs are the preferred choice for superior color, higher contrast ratios, longer panel life and fast refresh rates. To ensure smooth, crisp, clean, and more vibrant images, VIZIO integrated the Silicon Optix's REON HQV processing into the VP505XVT. This advanced technology brings out even the finest details with both Standard Definition (SD) and High Definition (HD) sources. Rendered colors are more natural, showing true color tones as they were intended. Moreover, Silicon Optix HQV's advanced noise reduction removes noise and artifacts caused by signal compression from cable and satellite providers. Since the HQV's REON chip can process two full channels of HD or SD channels, this allows users to achieve full resolution with picture-in-picture images. (See also, Exhibit 6).

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	Vizio further points out how this product is being sold through retailers such as Sears, Costco, and Sam's Club: Available through traditional consumer electronics retailers such as Circuit City and Sears and Club retailers like Costco and Sam's Club, the new VIZIO VP505XVT will ship in July with an estimated selling price of $1699.99. http://www.noydcom.com/press_release/vizio/XVT/VIZIO_XVT_PR_FNL.pdf (**Exhibit 2**) Hollywood Quality Video (HQV) advertises on their website this model makes use of such technology. From HQV's website's products page assessed on 11-27-2011 and August 2, 2012 at http://www.hqv.com/index.cfm?page=products.displays (**Exhibit 3**) Vizio  The Vizio VP505XVT products feature the finest technology available today, Including HQV® Hollywood Quality Video™ processing working with full high definition 1080p resolution, these plasma displays offer great visual experience in high-definition flat panel technology. Whether it's High Definition, Standard Definition, or EDTV, the signals are reproduced with amazing results. VP505XTV 50" Plasma TV HQV is a technology suite that performs many video error correction and video enhancement processes, including a pixel-based motion adaptive de-interlacing process. This process is shown on HQV's website's de-interlacing technology page accessed on 1-20-2011 and August 2, 2012 at http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**):

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	IDT HQV approach (pixel-based motion adaptive) HQV processing represents the most advanced de-interlacing technique available: a true pixel-based motion-adaptive approach. With HQV processing, motion is identified at the pixel level rather than the frame level. While it is mathematically impossible to avoid discarding pixels in motion during de-interlacing, HQV processing is careful to discard only the pixels that would cause combing artifacts. Everything else is displayed with full resolution. Pixel-based motion-adaptive de-interlacing avoids artifacts in moving objects and preserves full resolution of non-moving portions of the screen even if neighboring pixels are in motion.
receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced;	HQV technology includes de-interlacing video, and states that 4 fields are used "to implement a true per-pixel motion-adaptive deinterlacer." http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**):
using a current spatial field featuring missing spatial pixels and said spatial pixels with known values, located in said sequence of said pixels,…	HQV's deinterlacing process includes "the two fields being analyzed in the current frame[.]" http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**):
and one temporal field featuring temporal pixels with known values, located in said sequence of said fields,…	"In addition to the two fields being analyzed in the current frame, the two previous fields are required in order to determine which pixels are in motion." http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**). "HQV Processing continues to analyze at the per-pixel level using four-field analysis even in high-definition." http://www.hqv.com/index.cfm?page=tech.de-interlacing (**Exhibit 4**)
…for determining values of said missing pixels of said current spatial field;	Vizio televisions incorporating HQV use the data from the temporally related fields (as detailed further below) to establish the values of the missing pixels.

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Vizio Televisions or Displays with HQV, Including VP505XVT, VP504F, and VP605F

evaluating logical operations of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of said temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants, said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, \`and\`, \`or\`, and \`xor\`; and	This element requires that the missing pixels are identified through averaging, creating a multitude of various potential values to calculate off of using any applicable logical operation. This allows a great level of flexibility on calculating ideal formulas and values to utilize to de-interlace the video correcting for common errors that will result from a blind application of the temporal field's pixel values to the current field's missing pixels. Vizio televisions using HQV technology utilize HQV's pixel-based motion adaptive de-interlacing technique to try to correct these sorts of common errors as well. HQV notes that its pixel-based motion adaptive process for de-interlacing discards only pixels that would cause artifacts by analyzing movement at the pixel level across temporally related fields to measure the movement. In other words, HQV's processes must take a multitude of potential values to fill in for the missing current pixels and perform logical operations upon them to determine the best fit value in light of the motion present. As stated by Jed Deame, a co-founder and General Manager of Teranex/SiliconOptix: HQV processing represents the most advanced de-interlacing technique available: a true pixel-based motion-adaptive approach. With HQV processing, motion is identified at the pixel level rather than the frame level. While it is mathematically impossible to avoid discarding pixels in motion during de-interlacing, HQV processing is careful to discard only the pixels that would cause combing artifacts. Everything else is displayed with full resolution.

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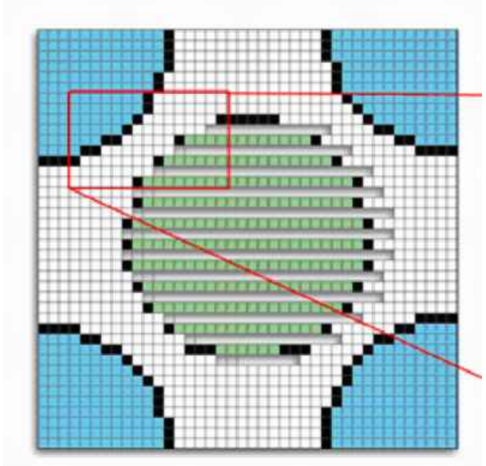
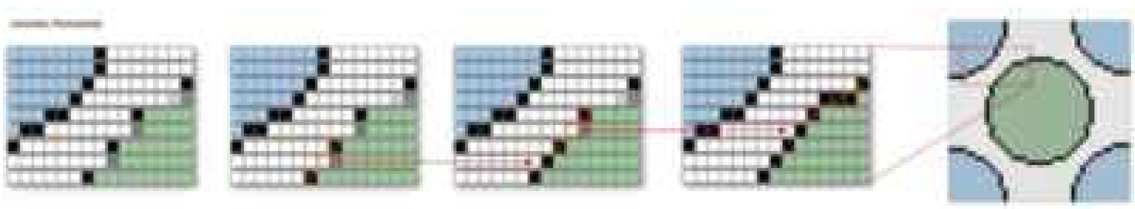
	 * * * "Second Stage" Diagonal Interpolation To recover some of the detail lost in the areas in motion, HQV processing implements a multi-direction diagonal filter that reconstructs some of the lost data at the edges of moving objects, filtering out any "jaggies." This operation is called "second-stage" diagonal interpolation because it's performed after the deinterlacing, which is the first stage of processing. Since diagonal interpolation is independent of the de-interlacing process, competitors have used similar algorithms with their frame-based de-interlacing approaches.  http://www.digitalsalesgroup.com/directlines/onkyo/newsletters/HQV_processing_for_Reon.pdf **(Exhibit 5)**

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Vizio Televisions or Displays with HQV, Including VP505XVT, VP504F, and VP605F

deciding upon assignment of said values to said missing spatial pixels according to results of said logical operations.	As shown above, Vizio televisions using HQV must decide upon assignment of values as dictated by the logical operations shown and discussed above, both through the initial step of selectively employing temporal placement of pixels from prior fields of the image (e.g., where motion is not detected), and through the step of assignment of values based upon, e.g., diagonal interpolation to fill in detail to replace values that might otherwise create feathering or combing artifacts.
Claim 15	
The method of claim 14, wherein said one temporal field featuring said temporal pixels with said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields.	In order for the HQV technology to perform 3:2 pulldown deinterlacing it is necessary to utilize both the immediate previous and immediate next temporal field in order that the 3 field exposure of one film frame may be distinguished from 2 field and 1 field exposures thereby ensuring that at least one of the group of immediate previous and immediate next temporal field is utilized as said one temporal field. See http://www.digitalsalesgroup.com/directlines/onkyo/newsletters/HQV_processing_for_Reon.pdf **(Exhibit 5)** ("HQV processing uses a per-pixel motion-adaptive and noise-adaptive temporal filter to avoid the artificial appearance and artifacts associated with conventional noise filters. To preserve maximum detail, moving pixels do not undergo unnecessary noise processing. In static areas, the strength of noise reduction is determined on a per-pixel basis, depending on the level of noise in the surrounding pixels as well as in previous frames, allowing the filter to adapt to the amount of noise in the image at any given time.").

EXHIBIT B
Infringement Chart
U.S. Patent No. 7,271,840
Vizio Televisions or Displays with Faroudja DCDi, Including P50HDTV10A, VM60P, GV46L0, RP56, L13 and JV50P

Vizio (or its customers or retailers) have infringed claims 56, 57, 58, 59, and 62 of U.S. Patent No. 7,721,840 ("the '840 patent") within the meaning of 35 U.S.C. 271(a) by making, using, selling, offering for sale, or importing into the United States televisions or displays incorporating Faroudja DCDi technology, including at least Vizio's P50HDTV10A, VM60P, GV46L0, RP56, L13 and JV50P. (See Exhibits 14, 17, 18, 19, 20, 21, 23.) As described, Vizio also induces and contributes to infringement within the meaning of 35 U.S.C. 271(b) and 35 U.S.C. 271(c). See manuals for Vizio TVs, e.g. P50HDTV10A user manual (**Exhibit 14**). This chart is meant to be exemplary of infringement by any Vizio television or display incorporating Faroudja DCDi technology. As discovery has just begun, Oplus reserves the right to add additional claims and/or products.

Claim	Vizio Televisions or Displays with Faroudja DCDi, Including P50HDTV10A, VM60P, GV46L0, RP56, L13 and JV50P
Claim 56	
56. A method determining entropy of a pixel of a real time streaming digital video image signal,	

EXHIBIT B
Infringement Chart
U.S. Patent No. 7,271,840
Vizio Televisions or Displays with Faroudja DCDi, Including P50HDTV10A, VM60P, GV46L0, RP56, L13 and JV50P

	Vizio's P50HDTV10A, VM60P, GV46L, RP56, L13 and JV50P televisions use Faroudja/Genesis chips to give the product advantages in video quality. See, e.g.:  **Exhibit 14**, at 2

EXHIBIT B
Infringement Chart
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VIZIO VM60P HDTV User Manual

Chapter 7 Miscellaneous Information

7.1 Specifications

Specifications	
Panel	60" Diagonal, 16:9 Aspect Ratio
Resolution	1366 x 768 pixels
Pixel (Dot) Pitch	0.966mm (H) x 0.966mm (V)
Display Compatibility	HDTV (720P)
Signal Compatibility	480i (SDTV), 480P (EDTV), 720P (HDTV), 1080i (HDTV)
Colors	1.07 Billion (10 bit)
Brightness	1200 cd/m^2 (typical)
Contrast	7000:1 (typical)
Viewing Angle	>178° (horizontal and vertical)
Inputs	1x Co-axial RF (ATSC/QAM/NTSC), 4x HDMI™ with HDCP (1 with Stereo Audio RCA), 2x Component YPbPr plus Stereo Audio, 1x RGB PC plus Stereo Audio, 2x S-Video plus Stereo Audio (shared in AV1 & AV2), 2x Composite Video plus Stereo Audio (AV1 & AV2)
Outputs	1x 5.1 Audio from DTV input only (SPDIF Optical), 1x Stereo Audio (RCA), 1x Headphone (Stereo Mini Jack)
Features	FHD 1080P support, 4x HDMI inputs, PIP, POP, CC, V-Chip, 3D Comb Filter, Zoom, Freeze, DCDi De-Interlace on Main and PIP screens, 3:2 or 2:2 Reverse Pull-down, ATSC, with 8VSB & QAM demodulation, with MPEG-2 decoding, NTSC Video decoding via RF (Antenna, Cable or Satellite) or Video (CVBS, S-Video or Component), Progressive Scan Video via Component YPbPr, VGA or HDMI, HDTV via HDMI or Component YPbPr, Computer up to 1366x768 via VGA or 640x480 via HDMI, SRS TruSurround XT, Color Temperature of 6500K, 5400K and 9300K (default) in VGA, Warm (5400K), Standard (6500K) and Cool (9300K) in Video, Independent Red, Green and Blue adjustment in TV, Video, HDMI and VGA for user fine tuning of color temperature with reset.
Speakers	Built-in, 20W x 2
Panel Life	45,000 hours to half the original brightness
Power	
Input	IEC Connector for direct power line connection
Voltage Range	100 ~ 240Vac at 50/60Hz

Exhibit 17 at 63

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VIZIO GV46L HDTV User Manual

Chapter 7 Miscellaneous Information

7.1 Specifications

Specifications	
Panel	46" Diagonal, 16:9 Aspect Ratio
Resolution	1366 x 768 pixels
Pixel (Dot) Pitch	0.7455mm (H) x 0.7455mm (V)
Display Compatibility	HDTV (720P)
Signal Compatibility	480i (SDTV), 480P (EDTV), 720P (HDTV), 1080i (HDTV)
Colors	16.77 Million
Brightness	500 cd/m^2 (typical)
Contrast	1200:1 (typical)
Viewing Angle	>178° (horizontal and vertical)
Inputs	1x Co-axial RF (ATSC/QAM/NTSC), 2x HDMI™ with HDCP (1 with Stereo Audio RCA), 2x Component YPbPr plus Stereo Audio, 1x RGB PC plus Stereo Audio, 2x S-Video plus Stereo Audio (shared in AV1 & AV2), 2x Composite Video plus Stereo Audio (AV1 & AV2)
Outputs	1x 5.1 Audio from DTV input only (SPDIF Optical), 1x Stereo Audio (RCA), 1x Headphone (Stereo Mini Jack)
Features	Zero Bright Pixel, PIP, POP, CC, V-Chip, 3D Comb Filter, Zoom, Freeze, DCDi De-Interlace, 3:2 or 2:2 Reverse Pull-down, ATSC, with 8VSB & QAM demodulation, with MPEG-2 decoding, NTSC Video decoding via RF (Antenna, Cable or Satellite) or Video (CVBS, S-Video or Component), Progressive Scan Video via Component YPbPr, VGA or HDMI, HDTV via HDMI or Component YPbPr, Computer 640x480, 800x600, 1024x768 via VGA or 640x480 via HDMI, SRS TruSurround XT, Color Temperature of 6500K, 5400K and 9300K (default) in VGA, 6500K in Video, Independent Red, Green and Blue adjustment in TV, Video, HDMI and VGA for user fine tuning of color temperature with reset.
Speakers	Detachable, 10W x 2 + 20W Sub
Panel Life	50,000 hours to half the original brightness
Power	

Exhibit 18 at 68.

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	VIZIO RP56 USER GUIDE **1 Introduction** **Features** • Huge 56-inch screen. • HDTV 16:9 Aspect Ratio. • Only 18.9 inches / 480 mm deep. • 75.9 lbs/34.5kg light. • Bright flicker free picture. • 480P, 720P, 1080I and HDTV signal compatibility. • 480i support for old NTSC television. • 640x480 VGA, 800x600 SVGA, 1024x768 XGA computer signal compatibility. • When displaying film-based media the TV automatically converts the content using 2:3 Pull Down to minimize motion artifacts to produce a stunning picture. • Uses DCDi™ Motion Adaptive Deinterlacing for state-of-the-art conversion of interlaced (NTSC or 1080i HD) to progressive scan. • DVI input with HDCP for the best display of Digital Video from components such as the VINC award winning Bravo Multi-Media Player that is recognized as providing the best picture from DVD and CD. **Exhibit 19** at 1.

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	VIZIO L13 LCD HDTV Specifications

Display	Screen Size	13.0 in.
	Display Type	LCD
	Resolution	640x480
	Display Capability	480i
	Contrast Ratio	500:1
	Aspect Ratio	4:3
	Brightness	450 cd/m²
	Response Time	15 ms
	Comb Filter	3D
	Viewing Angle	H 170 / V 155º
	Number of Colors	16.77 Million Colors
	Backlight Life	40000 hrs.
Size	Dimensions (WxHxD)	16.8 in. x 14.2 in. x 7.7 in. (42.67 cm x 36.07 cm x 19.56 cm)
	Weight	9.0 lbs. (4.08 kg)
Input	Composite Video	1 x Composite Video
	Composite Audio	1 x Composite Audio
	S-Video	1 x S-Video
	Component Video	1 x Component Video
	Component Audio	1 x Component Audio
	PC / VGA	1 x PC / VGA
	PC / VGA Audio	1 x PC / VGA Audio
	Cable / Antenna	1 x Cable / Antenna
Output	Headphone Jack	1 x Headphone Jack
Audio	Output Mode	Stereo
	Output Power	2.5W
	Number Speakers	2
Convenience Features	Parental Lock	V-Chip
	Closed Caption	Yes
	Additional Features	DCDi De-Interlace Progressive Scan

Exhibit 20.

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Here is Vizios newest plasma......i mean surround sound.........i guess both

http://www.vizio.com/products/detail.aspx?pid=32
Introducing VIZIO's newest All-In-One home theater solution, the VIZIO JV50P "Jive" Plasma HDTV.

VIZIO's JV50P "Jive" sets a new benchmark for home entertainment, being the first TV manufacturer in the industry to offer a 50" High-Definition Plasma TV coupled with a true Dolby Digital 5.1 surround-sound system. The new JV50P "Jive" offers true digital High Definition TV performance with integrated digital TV tuner, support for 1080i resolution, amazing 15,000:1 contrast ratio and an optical audio input to allow your new VIZIO "Jive" to be your all-in-one home theater solution.

DCDi by Faroudja Low Angle De-interlacing Processing for superior video quality.

VIZIO Universal Backlit and ergonomic Remote Control and TV

With" Wireless Speakers" option enabled, wireless transmission takes place at 5.8GHz

Exhibit 21

The Faroudja/Genesis processing chips included in these Vizio televisions use (for instance) Genesis' Faroudja DCDi technology which performs a method determining entropy of a pixel of a real time streaming digital video image signal. This is an aspect of a motion adaptive noise reduction process.

For example, from a data sheet accessed on 1-19-2011 at http://www.datasheetarchive.com/FLI2300-datasheet.html **(Exhibit 22):**

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	The FLI2300 Digital Video Format Converter produces the highest quality upconverted video output from a variety of interlaced video inputs including 525i/50 (NTSC), 625i/50 (PAL or SECAM), 480p/60, 720p/60, 1080i/60 (ATSC) and RGB graphics up to SXGA, with a maximum pixel rate of 75 MHz. It uses patented and patent pending motion-adaptive deinterlacing that selects the optimal filtering on a per-pixel basis to produce maximum resolution without introducing motion artifacts. This includes film mode for proper handling of 3:2 and 2:2 pulldown as well as bad edit detection and correction, technologies invented by Faroudja Laboratories. Prior to deinterlacing, the built-in motion-adaptive noise-reducer can be used to improve the signal-to-noise ratio, resulting in further improved deinterlacing. Another proprietary feature is Directional Correlational Deinterlacing (DCDi™). This technology identifies edges at any angle in moving images and interpolates along the edge to produce smooth, natural images without the staircasing or jaggies produced by other deinterlacing technologies. The
for automatically correcting an error produced during real time editing of the real time streaming digital video image input signal,	Steaming digital video signals must be corrected and edited in real time without user intervention to be able to perform as a live streaming device. Therefore, Vizio's Televisions, like all modern consumer digital video signal editors, performs its edits in real time, and any error correction performed must, by nature, be automatic.
comprising the steps of: (a) receiving and characterizing the	Among other features of the Genesis chipset Vizio utilizes, there is the Motion Adaptive Noise Reduction which works off of a temporal filtering system. The Motion Adaptive Noise

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streaming digital video image input signal during a pre-determined time interval;	Reduction must utilize a temporal filtering system because it must read and recognize movement, which is impossible without considering multiple frames or fields across a pre-determined time interval. The following is originally from Genesis Microchip's technology page accessed on 1-19-2011 at http://www.gnss.com/technology.phtml; the quote is now found at http://www.faroudja.com/internet/faroudja/brands/dcdi-cinema.jsp **Exhibit 24**: • **Motion Adaptive Noise Reduction** Noise on an image is typically eliminated or reduced by filtering. Filtering can be done spatially, (2-D), or temporally, (3-D). Spatial filtering results in a soft image with loss of detail. Temporal filtering does not create loss of detail, but if done incorrectly, does result in smearing or ghosting of moving objects in the image. Genesis uses Motion Adaptive processing to reduce noise without introducing smearing.
(b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and	This element requires that the video error correction method select an area (the entirety or a subset) of a field, then also establish identical areas in the field before and the field after. This selection creates a temporal field for analysis. The Motion Adaptive Noise Reduction of the Genesis chipsets utilized by the Vizio Televisions must consider a temporal field to detect motion with any accuracy, which is further indicated by the fact that the technology is based on temporal noise reduction filtering. Only through considering a temporally related portion of time may motion by properly detected to ensure that error correction does not affect motion to create the smearing or ghosting that Genesis warns of above. E.g., **Exhibit 25** p. 17**:**

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	When a deinterlacer scales a 240-line field to a 480-line frame, another word for that process is upsampling, because it uses 240 lines worth of input samples (or pixels) to create 480 lines of output samples. Hence the number of samples is going up. Simplicity itself. To do this, each pixel of the 480 line output is created by applying a weighted average of several of the input pixels. Under normal circumstances, those input pixels will be the ones just above and below the output pixel's location. In other words, the sampling angle is completely vertical (or 90 degrees). With DCDi™, the direction of sampling can vary from pixel to pixel. When creating an output pixel, the algorithm looks at a small local patch of input pixels, and looks for a strong diagonal contour. If there is one, then the sampling direction is set to be perpendicular to the local contour. For example, if the algorithm determines that there is a 45-degree diagonal line running through the pixel in question, then the input samples will be gathered along a diagonal line that crosses the line in the image at a right angle (or 135^{0}). When there is no easily identifiable contour, the algorithm falls back on the standard angle of 90^{0}. The result of all this math is a much smoother image, with fewer annoying jagged edges. It doesn't necessarily look exactly like the "true" image that you'd see if the source were higher resolution, because the algorithm can't magically recreate details that aren't there in the source, but it does represent a better interpolation of the image, more like what a human might do if asked to smooth out the image by hand. It's also possible to see artifacts at times where the algorithm looks worse than the simpler strategy (for example the resolution wedge on the WHQL disc), but those are few and far between. Most of the time, DCDi™ is a big improvement. See also**, Exhibit 26.**
(c)determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local	This element requires the pixels of the temporal fields to be compared to detect pixels affected by noise, which is a form of video error that is based on the entropy of the data. For the Genesis chipset utilized by Vizio's televisions to perform temporal comparisons, especially for the motion detection, it must measure the value of each pixel, then measure the value of other pixels in the same spatial neighborhood across multiple temporally associated

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neighborhoods of said neighboring pixels, said determining comprising the steps of:	frames. Comparing these values is how noise can be established to be affecting any pixels within these temporally associated frames. E.g., **Exhibit 25** p. 17**:** When a deinterlacer scales a 240-line field to a 480-line frame, another word for that process is upsampling, because it uses 240 lines worth of input samples (or pixels) to create 480 lines of output samples. Hence the number of samples is going up. Simplicity itself. To do this, each pixel of the 480 line output is created by applying a weighted average of several of the input pixels. Under normal circumstances, those input pixels will be the ones just above and below the output pixel's location. In other words, the sampling angle is completely vertical (or 90 degrees). With DCDi™, the direction of sampling can vary from pixel to pixel. When creating an output pixel, the algorithm looks at a small local patch of input pixels, and looks for a strong diagonal contour. If there is one, then the sampling direction is set to be perpendicular to the local contour. For example, if the algorithm determines that there is a 45-degree diagonal line running through the pixel in question, then the input samples will be gathered along a diagonal line that crosses the line in the image at a right angle (or 135°). When there is no easily identifiable contour, the algorithm falls back on the standard angle of 90°. The result of all this math is a much smoother image, with fewer annoying jagged edges. It doesn't necessarily look exactly like the "true" image that you'd see if the source were higher resolution, because the algorithm can't magically recreate details that aren't there in the source, but it does represent a better interpolation of the image, more like what a human might do if asked to smooth out the image by hand. It's also possible to see artifacts at times where the algorithm looks worse than the simpler strategy (for example the resolution wedge on the WHQL disc), but those are few and far between. Most of the time, DCDi™ is a big improvement. See also**, Exhibit 26.** See **Exhibit 24:**

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	Motion adaptive noise reduction Noise on an image is typically eliminated or reduced by filtering. Filtering can be done spatially, (2-D), or temporally, (3-D). Spatial filtering results in a soft image with loss of detail. Temporal filtering does not create loss of detail, but if done incorrectly, does result in smearing or ghosting of moving objects in the image. ST uses Motion Adaptive processing to reduce noise without introducing smearing.
(i) calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;	This element is the first step of the above comprising element, where the selected area of the fields are compared, detecting the changes that occur between each and to create a weighted change between each. When the Genesis chipset utilized by Vizio's televisions compares these temporally related frames, the values of the neighborhood of pixels on each much be measured, then compared to establish the change over time among the temporally related fields. E.g., **Exhibit 25** p. 17**:**

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	When a deinterlacer scales a 240-line field to a 480-line frame, another word for that process is upsampling, because it uses 240 lines worth of input samples (or pixels) to create 480 lines of output samples. Hence the number of samples is going up. Simplicity itself. To do this, each pixel of the 480 line output is created by applying a weighted average of several of the input pixels. Under normal circumstances, those input pixels will be the ones just above and below the output pixel's location. In other words, the sampling angle is completely vertical (or 90 degrees). With DCDi™, the direction of sampling can vary from pixel to pixel. When creating an output pixel, the algorithm looks at a small local patch of input pixels, and looks for a strong diagonal contour. If there is one, then the sampling direction is set to be perpendicular to the local contour. For example, if the algorithm determines that there is a 45-degree diagonal line running through the pixel in question, then the input samples will be gathered along a diagonal line that crosses the line in the image at a right angle (or 135⁰). When there is no easily identifiable contour, the algorithm falls back on the standard angle of 90⁰. The result of all this math is a much smoother image, with fewer annoying jagged edges. It doesn't necessarily look exactly like the "true" image that you'd see if the source were higher resolution, because the algorithm can't magically recreate details that aren't there in the source, but it does represent a better interpolation of the image, more like what a human might do if asked to smooth out the image by hand. It's also possible to see artifacts at times where the algorithm looks worse than the simpler strategy (for example the resolution wedge on the WHQL disc), but those are few and far between. Most of the time, DCDi™ is a big improvement. See also**, Exhibit 26.** See **Exhibit 24:**

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	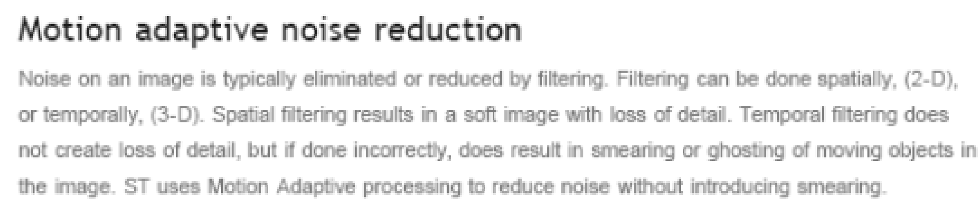 Motion adaptive noise reduction Noise on an image is typically eliminated or reduced by filtering. Filtering can be done spatially, (2-D), or temporally, (3-D). Spatial filtering results in a soft image with loss of detail. Temporal filtering does not create loss of detail, but if done incorrectly, does result in smearing or ghosting of moving objects in the image. ST uses Motion Adaptive processing to reduce noise without introducing smearing.
(ii) calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field;	This element requires a value to be developed for what a pixel determined to be affected by noise should be in the current field, based on the weighted change established. Once the Genesis chipset utilized by Vizio's television performs its measurements and comparisons, calculation must be made to determine what the proper value of a pixel affected by noise should be. E.g., **Exhibit 25** p. 17**:**

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When a deinterlacer scales a 240-line field to a 480-line frame, another word for that process is upsampling, because it uses 240 lines worth of input samples (or pixels) to create 480 lines of output samples. Hence the number of samples is going up. Simplicity itself. To do this, each pixel of the 480 line output is created by applying a weighted average of several of the input pixels. Under normal circumstances, those input pixels will be the ones just above and below the output pixel's location. In other words, the sampling angle is completely vertical (or 90 degrees).

With DCDi™, the direction of sampling can vary from pixel to pixel. When creating an output pixel, the algorithm looks at a small local patch of input pixels, and looks for a strong diagonal contour. If there is one, then the sampling direction is set to be perpendicular to the local contour. For example, if the algorithm determines that there is a 45-degree diagonal line running through the pixel in question, then the input samples will be gathered along a diagonal line that crosses the line in the image at a right angle (or 135°). When there is no easily identifiable contour, the algorithm falls back on the standard angle of 90°.

The result of all this math is a much smoother image, with fewer annoying jagged edges. It doesn't necessarily look exactly like the "true" image that you'd see if the source were higher resolution, because the algorithm can't magically recreate details that aren't there in the source, but it does represent a better interpolation of the image, more like what a human might do if asked to smooth out the image by hand. It's also possible to see artifacts at times where the algorithm looks worse than the simpler strategy (for example the resolution wedge on the WHQL disc), but those are few and far between. Most of the time, DCDi™ is a big improvement.

See also**, Exhibit 26.**

See **Exhibit 24:**

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(iii) adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and	This element requires it to be established which pixels in each of the temporally related fields are affected by noise or other errors, to establish the level of entropy for that pixel. After all, noise in a previous or next field should not be considered in the calculation for the proper value of a pixel in the current field. For the Genesis chipset utilized by the Vizio televisions calculations to be accurate for what the error corrected value should be, pixels also affected by noise should not be used. In addition, the chipset further relies on the measurement of movement in pixels between the frames to avoid creating ghosting by use of moving elements in the frames. E.g., **Exhibit 25** p. 17**:**

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(iv) calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said pixel entropy counters of said pixels, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to	This element takes the conclusions from the above steps to establish the new, proper, value for any pixels in the current field affect by noise. The Genesis chipset utilized by Vizio's televisions then uses the correct, applicable , pixels in the neighboring fields to determine the new value for the pixels in the current field that must be adjusted and then actually adjust to said value. Applying the result of the calculations to replace the pixels affected by error is also performed. Also of note, the Genesis chipset utilized by Vizio's televisions does not utilize only the Motion Adaptive Noise Reduction for temporal filtering. The TrueLife Enhancement and Cross Color Suppression also are based on temporal filtering, because they, like the above, require the measurement of movement between frames. E.g., **Exhibit 25** p. 17**:**

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said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.	When a deinterlacer scales a 240-line field to a 480-line frame, another word for that process is upsampling, because it uses 240 lines worth of input samples (or pixels) to create 480 lines of output samples. Hence the number of samples is going up. Simplicity itself. To do this, each pixel of the 480 line output is created by applying a weighted average of several of the input pixels. Under normal circumstances, those input pixels will be the ones just above and below the output pixel's location. In other words, the sampling angle is completely vertical (or 90 degrees). With DCDi™, the direction of sampling can vary from pixel to pixel. When creating an output pixel, the algorithm looks at a small local patch of input pixels, and looks for a strong diagonal contour. If there is one, then the sampling direction is set to be perpendicular to the local contour. For example, if the algorithm determines that there is a 45-degree diagonal line running through the pixel in question, then the input samples will be gathered along a diagonal line that crosses the line in the image at a right angle (or 135^{0}). When there is no easily identifiable contour, the algorithm falls back on the standard angle of 90^{0}. The result of all this math is a much smoother image, with fewer annoying jagged edges. It doesn't necessarily look exactly like the "true" image that you'd see if the source were higher resolution, because the algorithm can't magically recreate details that aren't there in the source, but it does represent a better interpolation of the image, more like what a human might do if asked to smooth out the image by hand. It's also possible to see artifacts at times where the algorithm looks worse than the simpler strategy (for example the resolution wedge on the WHQL disc), but those are few and far between. Most of the time, DCDi™ is a big improvement. See also**, Exhibit 26.** See **Exhibit 24:**

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	Motion adaptive noise reduction Noise on an image is typically eliminated or reduced by filtering. Filtering can be done spatially, (2-D), or temporally, (3-D). Spatial filtering results in a soft image with loss of detail. Temporal filtering does not create loss of detail, but if done incorrectly, does result in smearing or ghosting of moving objects in the image. ST uses Motion Adaptive processing to reduce noise without introducing smearing.
Claim 57	
57. The method of claim 56, whereby in step (a) the streaming digital video image input signal is received following subjecting the streaming digital video image input signal to a pull down mode conversion method selected from the group consisting of a 3:2 pull down mode conversion method, a 2:2 pull down mode conversion method, and a scan rate conversion, other than the 3:2 pull down mode conversion and the 2:2 pull down mode conversion, from a non-interlaced film format or a progressive video format to an interlaced video format.	The processing chips included in these Vizio televisions use (for instance) Genesis' Faroudja DCDi technology's Format Converter IC operates with 3:2 and 2:2 pulldown. For example, from a data sheet accessed on 1-19-2011 at http://www.datasheetarchive.com/FLI2300-datasheet.html **(Exhibit 22):** The FLI2300 Digital Video Format Converter produces the highest quality upconverted video output from a variety of interlaced video inputs including 525i/50 (NTSC), 625i/50 (PAL or SECAM), 480p/60, 720p/60, 1080i/60 (ATSC) and RGB graphics up to SXGA, with a maximum pixel rate of 75 MHz. It uses patented and patent pending motion-adaptive deinterlacing that selects the optimal filtering on a per-pixel basis to produce maximum resolution without introducing motion artifacts. This includes film mode for proper handling of 3:2 and 2:2 pulldown as well as bad edit detection and correction, technologies invented by Faroudja Laboratories. Prior to deinterlacing, the built-in motion-adaptive noise-reducer can be used to improve the signal-to-noise ratio, resulting in further improved deinterlacing. Another proprietary feature is Directional Correlational Deinterlacing (DCDi™). This technology identifies edges at any angle in moving images and interpolates along the edge to produce smooth, natural images without the staircasing or jaggies produced by other deinterlacing technologies. The
Claim 58	
58. The method of claim 56, whereby step (b) further comprises:	The Vizio TVs utilize NTSC video signals.

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(i) assigning a first local neighborhood of said neighboring pixels to each said virtual pixel within a missing horizontal line of said current field.	See, e.g. **Exhibit17** at 63:

Chapter 7 Miscellaneous Information

7.1 Specifications

Specifications	
Panel	60" Diagonal, 16:9 Aspect Ratio
Resolution	1366 x 768 pixels
Pixel (Dot) Pitch	0.966mm (H) x 0.966mm (V)
Display Compatibility	HDTV (720P)
Signal Compatibility	480i (SDTV), 480P (EDTV), 720P (HDTV), 1080i (HDTV)
Colors	1.07 Billion (10 bit)
Brightness	1200 cd/m^2 (typical)
Contrast	7000:1 (typical)
Viewing Angle	>178° (horizontal and vertical)
Inputs	1x Co-axial RF (ATSC/QAM/NTSC), 4x HDMI™ with HDCP (1 with Stereo Audio RCA), 2x Component YPbPr plus Stereo Audio, 1x RGB PC plus Stereo Audio, 2x S-Video plus Stereo Audio (shared in AV1 & AV2), 2x Composite Video plus Stereo Audio (AV1 & AV2)
Outputs	1x 5.1 Audio from DTV input only (SPDIF Optical), 1x Stereo Audio (RCA), 1x Headphone (Stereo Mini Jack)
Features	FHD 1080P support, 4x HDMI inputs, PIP, POP, CC, V-Chip, 3D Comb Filter, Zoom, Freeze, DCDi De-Interlace on Main and PIP screens, 3:2 or 2:2 Reverse Pull-down, ATSC, with 8VSB & QAM demodulation, with MPEG-2 decoding, NTSC Video decoding via RF (Antenna, Cable or Satellite) or Video (CVBS, S-Video or Component), Progressive Scan Video via Component YPbPr, VGA or HDMI, HDTV via HDMI or Component YPbPr, Computer up to 1366x768 via VGA or 640x480 via HDMI, SRS TruSurround XT, Color Temperature of 6500K, 5400K and 9300K (default) in VGA, Warm (5400K), Standard (6500K) and Cool (9300K) in Video, Independent Red, Green and Blue adjustment in TV, Video, HDMI and VGA for user fine tuning of color temperature with reset.

See also, **Exhibit 14; Exhibit 18** at 68; **Exhibit 19** at 1; **Exhibit 20**; **Exhibit 23**.

When the streaming digital video image input signal is an interlaced NTSC video signal step (b) further comprises DCDi assigning a first local neighborhood of said neighboring pixels to each virtual pixel within a missing horizontal line (i.e. the even or odd lines) of the current field (which contains the odd or even lines respectively). This association arises because of the standard interlacing format of NTSC video and results in proper deinterlacing of the input video signal in the presence of static images in the video signal.

59. The method of claim 58, whereby step (b) further comprises: (ii) assigning a second local	The Vizio TVs utilize NTSC video signals. See, e.g. **Exhibit 17** at 63:

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<table>
<tr>
<td>neighborhood of said neighboring pixels to each said pixel located in said previous field, and to each said pixel located in said next field.</td>
<td>
Chapter 7 Miscellaneous Information
7.1 Specifications
<table>
<tr><th colspan="2">Specifications</th></tr>
<tr><td>Panel</td><td>60" Diagonal, 16:9 Aspect Ratio</td></tr>
<tr><td>Resolution</td><td>1366 x 768 pixels</td></tr>
<tr><td>Pixel (Dot) Pitch</td><td>0.966mm (H) x 0.966mm (V)</td></tr>
<tr><td>Display Compatibility</td><td>HDTV (720P)</td></tr>
<tr><td>Signal Compatibility</td><td>480i (SDTV), 480P (EDTV), 720P (HDTV), 1080i (HDTV)</td></tr>
<tr><td>Colors</td><td>1.07 Billion (10 bit)</td></tr>
<tr><td>Brightness</td><td>1200 cd/m^2 (typical)</td></tr>
<tr><td>Contrast</td><td>7000:1 (typical)</td></tr>
<tr><td>Viewing Angle</td><td>>178° (horizontal and vertical)</td></tr>
<tr><td>Inputs</td><td>1x Co-axial RF (ATSC/QAM/NTSC), 4x HDMI™ with HDCP (1 with Stereo Audio RCA), 2x Component YPbPr plus Stereo Audio, 1x RGB PC plus Stereo Audio, 2x S-Video plus Stereo Audio (shared in AV1 & AV2), 2x Composite Video plus Stereo Audio (AV1 & AV2)</td></tr>
<tr><td>Outputs</td><td>1x 5.1 Audio from DTV input only (SPDIF Optical), 1x Stereo Audio (RCA), 1x Headphone (Stereo Mini Jack)</td></tr>
<tr><td>Features</td><td>FHD 1080P support, 4x HDMI inputs, PIP, POP, CC, V-Chip, 3D Comb Filter, Zoom, Freeze, DCDi De-Interlace on Main and PIP screens, 3:2 or 2:2 Reverse Pull-down, ATSC, with 8VSB & QAM demodulation, with MPEG-2 decoding, NTSC Video decoding via RF (Antenna, Cable or Satellite) or Video (CVBS, S-Video or Component), Progressive Scan Video via Component YPbPr, VGA or HDMI, HDTV via HDMI or Component YPbPr, Computer up to 1366x768 via VGA or 640x480 via HDMI, SRS TruSurround XT, Color Temperature of 6500K, 5400K and 9300K (default) in VGA, Warm (5400K), Standard (6500K) and Cool (9300K) in Video, Independent Red, Green and Blue adjustment in TV, Video, HDMI and VGA for user fine tuning of color temperature with reset.</td></tr>
</table>
See also, Exhibit 14; Exhibit 18 at 68; Exhibit 19 at 1; Exhibit 20; Exhibit 23.

When the streaming digital video image input signal is an interlaced NTSC video signal step (b) further comprises DCDi assigning a second local neighborhood of said neighboring pixels to each pixel located in the previous field and each pixel located in the next field. This association arises because of the standard interlacing format of NTSC video. This operation results in proper deinterlacing of the input video signal in the presence of image motion in the video signal.
</td>
</tr>
<tr><td>Claim 62</td><td></td></tr>
<tr>
<td>62. The method of claim 59, whereby step (b) further comprises: (iii) selecting a said previous pixel</td>
<td>The Vizio TVs utilize NTSC video signals.

See, e.g. Exhibit 17 at 63:</td>
</tr>
</table>

EXHIBIT B
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Vizio Televisions or Displays with Faroudja DCDi, Including P50HDTV10A, VM60P, GV46L0, RP56, L13 and JV50P

and a said next pixel as two sequential pixels in said previous field and in said next field, respectively.

Chapter 7 Miscellaneous Information

7.1 Specifications

Specifications	
Panel	60" Diagonal, 16:9 Aspect Ratio
Resolution	1366 x 768 pixels
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Display Compatibility	HDTV (720P)
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Colors	1.07 Billion (10 bit)
Brightness	1200 cd/m^2 (typical)
Contrast	7000:1 (typical)
Viewing Angle	>178° (horizontal and vertical)
Inputs	1x Co-axial RF (ATSC/QAM/NTSC), 4x HDMI™ with HDCP (1 with Stereo Audio RCA), 2x Component YPbPr plus Stereo Audio, 1x RGB PC plus Stereo Audio, 2x S-Video plus Stereo Audio (shared in AV1 & AV2), 2x Composite Video plus Stereo Audio (AV1 & AV2)
Outputs	1x 5.1 Audio from DTV input only (SPDIF Optical), 1x Stereo Audio (RCA), 1x Headphone (Stereo Mini Jack)
Features	FHD 1080P support, 4x HDMI inputs, PIP, POP, CC, V-Chip, 3D Comb Filter, Zoom, Freeze, DCDi De-Interlace on Main and PIP screens, 3:2 or 2:2 Reverse Pull-down, ATSC, with 8VSB & QAM demodulation, with MPEG-2 decoding, NTSC Video decoding via RF (Antenna, Cable or Satellite) or Video (CVBS, S-Video or Component), Progressive Scan Video via Component YPbPr, VGA or HDMI, HDTV via HDMI or Component YPbPr, Computer up to 1366x768 via VGA or 640x480 via HDMI, SRS TruSurround XT, Color Temperature of 6500K, 5400K and 9300K (default) in VGA, Warm (5400K), Standard (6500K) and Cool (9300K) in Video, Independent Red, Green and Blue adjustment in TV, Video, HDMI and VGA for user fine tuning of color temperature with reset.

See also, **Exhibit 14**; **Exhibit 18** at 68; **Exhibit 19** at 1; **Exhibit 20**; **Exhibit 23**.

When the streaming digital video image input signal is an interlaced NTSC video signal the previous pixel and the next pixel (of the spatial location corresponding to the virtual pixel) in the previous and next fields respectively are selected by DCDi as two sequential pixels. This association arises because of the standard interlacing format of NTSC video and produces proper deinterlacing in the presence of editing errors and field to field image motion.

EXHIBIT C
Infringement Chart
U.S. Patent No. 6,239,842
Vizio Televisions or Displays with MediaTek MDDi Motion Adaptive Deinterlacing technology

Vizio (or its customers or retailers) have infringed claims 7, 8, 9, 14, and 15 of U.S. Patent No. 6,239,842 ("the '842 patent") within the meaning of 35 U.S.C. 271(a) by making, using, selling, offering for sale, or importing in to the United States televisions or displays incorporating MediaTek MDDi Motion Adaptive Deinterlacing technology, including at least Vizio's L42HDTV10A, GV42L, VW46L FHDTV10A, L37HDTV, and P42HDTV10A (e.g. MediaTek MT535X, MT538X and MT820X video signal processing chips with MDDi). As described, Vizio also induces and contributes to infringement within the meaning of 35 U.S.C. 271(b) and 35 U.S.C. 271(c). On information and belief, many more Vizio televisions incorporate MEdiaTek MDDi Motion Adaptive Deinterlacing technology. This claim chart is meant to be exemplary of infringement by any Vizio television incorporating MDDi Motion Adaptive Deinterlacing technology. As discovery has just begun, Oplus reserves the right to add additional claims and/or products.

Refer to service manuals for the representative Vizio TVs, e.g. VW46L FHDTV10A service manual PDF pages 25-29, **(Exhibit 9)**; L42HDTV10A/GV42L service manual PDF pages 20-26, 50, **(Exhibit 8)**; L37HDTV service manual PDF pages 30-32, 37-43 **(Exhibit 10),** P42HDTV10A service manual PDF pages 25-28, 33-34, **(Exhibit 11)**.

Claim	Infringement by Vizio Televisions or Displays Incorporating MDDi Motion Adaptive Deinterlacing technology
Claim 7	
A method for de-interlacing an interlaced video format, the method comprising the steps of:	All Vizio flat panel (e.g. HDTV) televisions must deinterlace received interlaced video signal (e.g. NTSC, 1080i HDTV) in order to display those signals in progressive form on the flat panel. See **Exhibit 8**, p. 26:

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	3.De-interlacing 2nd generation advanced Motion adaptive de-interlacing Automatic detect film or video source 3:2/2:2 pull down source detection Main/PIP 2 independent de-interlacing processor See **Exhibit 8**, p. 50: whole new viewing experience.Credible Audio/Video Quality : The MT5351 use advanced motion-adaptive de-interlace algorithm to achieve the best movie/video playback , The embedded See **Exhibit 9**, p. 26: **World-Leading Audio/Video Technology:** The MT538x family has built-in high resolution and high-quality audio codec. It includes MediaTek MDDi™ de-interlace solution to generate very smooth picture quality for motions. A 3D comb filter added to the TV decoder recovers great detail for still pictures. The special color processing technology provides natural, deep colors and true studio quality graphics. See **Exhibit 9**, p. 29:

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Vizio Televisions or Displays with MediaTek MDDi Motion Adaptive Deinterlacing technology

10. Automatic detect films or video sources
11. 3:2/2:2 pull down source detection
12. The MT5380 support bob mode de-interlace.
    The MT5381 support 1366 width motion-adaptive de-interlace.
    The MT5382 supports maximum 1920 width motion-adaptive de-interlace. The entire MT538x family supports excellent low angle image processing.

See **Exhibit 10**, p. 38:

MT8205 Application

MT8205 is a highly integrated single chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV Decoder to retrieve the best image from popular composite signals. On-chip advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor.

See **Exhibit 10**, p. 43:

b. De-interlacing

Automatic detect film or video source

3:2/2:2 pull down source detection

Advanced Motion adaptive de-interlacing

See **Exhibit 11**, p. 34:

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	MT8205 Application MT8205 is a highly integrated single chip for PDP TV supporting video input and output format up to HDTV. It includes 3D comb filter TV Decoder to retrieve the best image from popular composite signals. On-chip advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor. Optional 2nd HDTV or SDTV inputs allows user to see multi-programs on same screen. Flexible scalar provides wide adoption to various PDP panel for different video sources. Its on-chip audio processor decodes analog signals from Tuner with lip sync control, delivering high quality post-processed sound effect to customers. On-chip microprocessor reduces the system BOM and shortens the schedule of UI design by high level C program. MT8205 is a cost-effective and high performance HDTV-ready solution to TV manufactures.
(a) receiving the interlaced video format feature a sequence of fields of pixels to be de-interlaced;	The interlaced video signal is received by the TV via an antenna connector and tuner and/or video connector. Interlaced video signals by definition incorporate a sequence of fields of pixels with the commonly used interlaced video signals (e.g. NTSC, 1080i) having two fields with one field containing all of the even scan lines and the other field containing all of the odd scanning lines. The fields by definition have missing scanning lines and thus missing pixels of those scanning lines. See **Exhibit 8**, p. 21:

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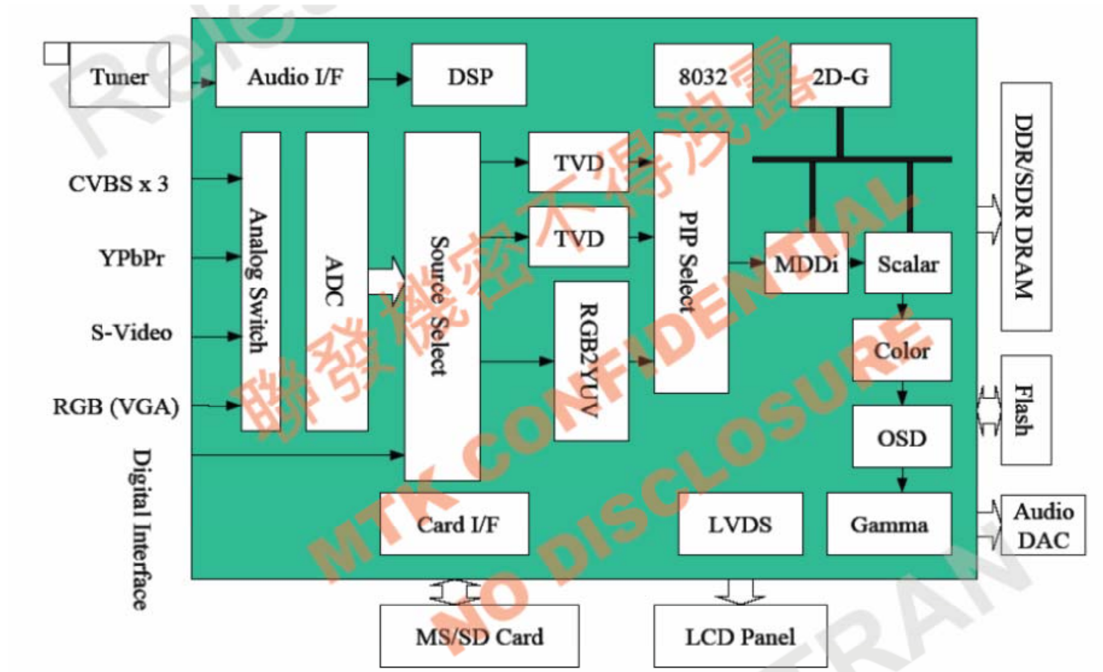
	BOLOCK DIAGRAM  See **Exhibit 9**, p. 27:

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	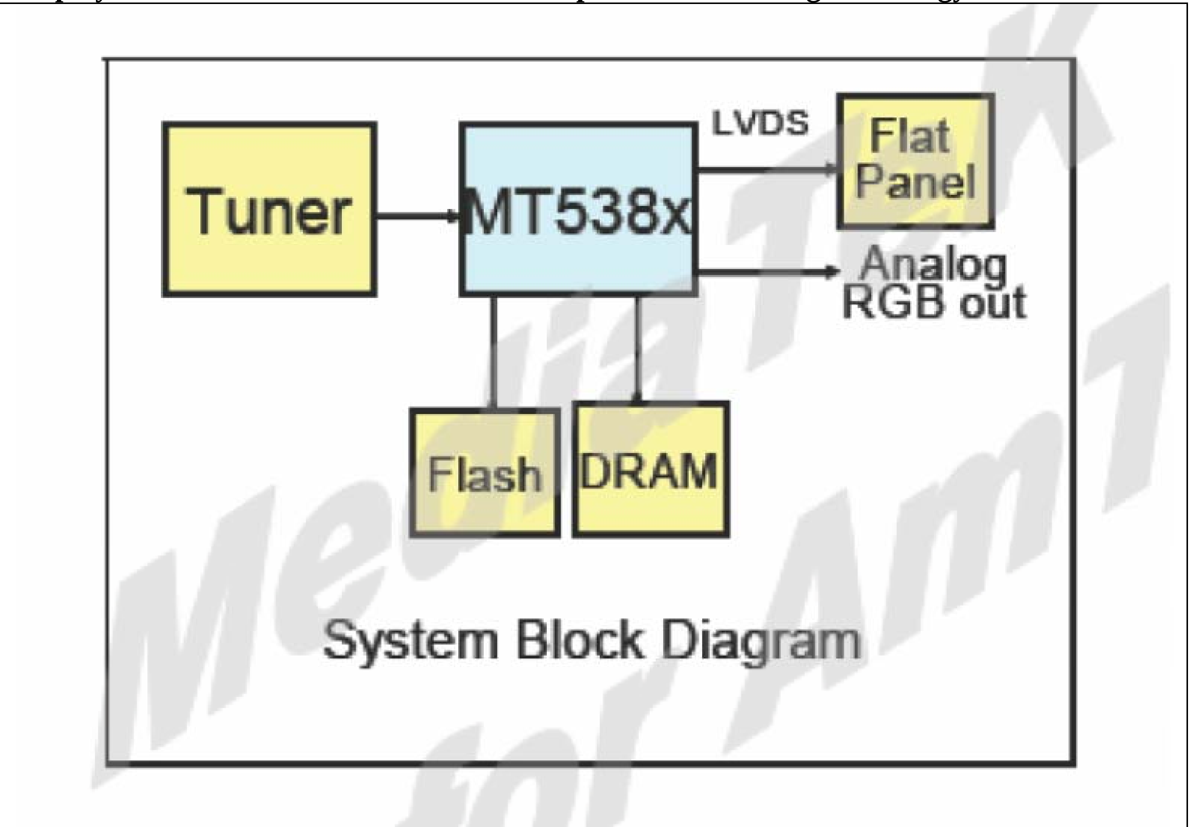 See **Exhibit 10**, p. 31:

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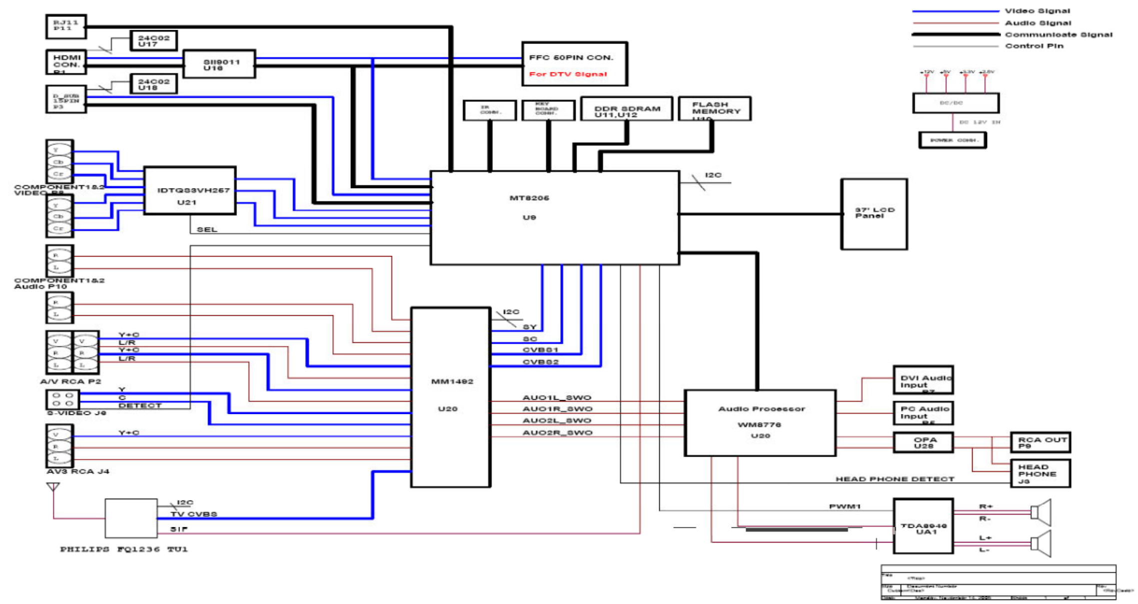
	Main Board Block Diagram  See **Exhibit 11**, p: 27

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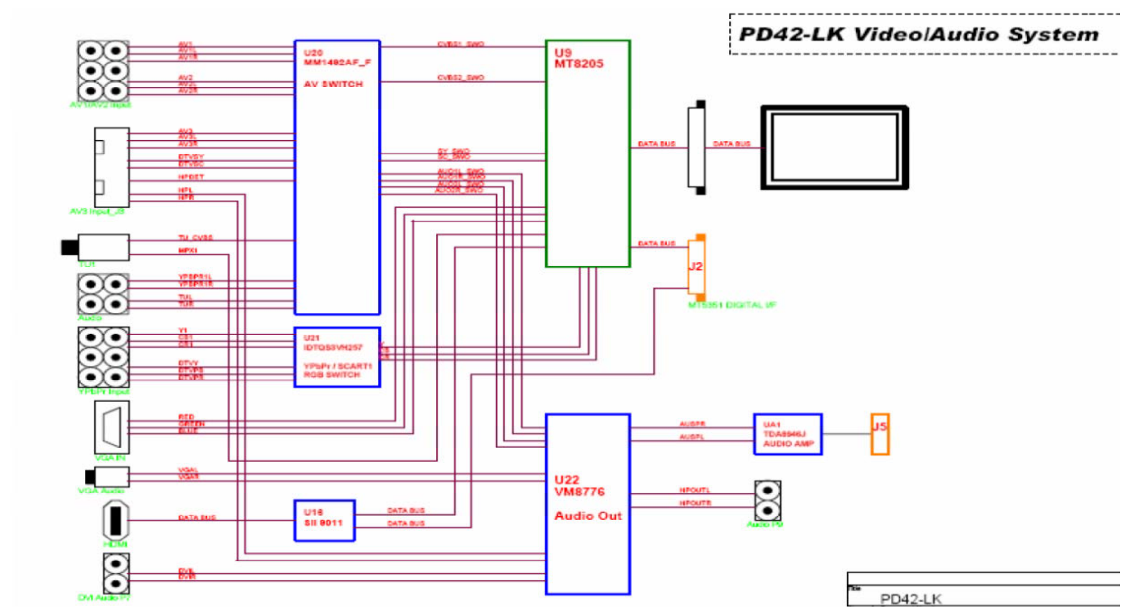
Vizio Televisions or Displays with MediaTek MDDi Motion Adaptive Deinterlacing technology

	Main Board Block Diagram 
(b) evaluating logical operations of linear combinations of values selected from the group consisting of averages of known values of spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of	The MDDi algorithm is a motion adaptive de-interlacer. (e.g. **Exhibit 8**, p. 26; **Exhibit 9**, p. 29; **Exhibit 10**, p. 38 and 43; **Exhibit 11**, p. 34). See also, e.g., MediaTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (**Exhibit 16**): However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation.

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said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants,	The MDDi algorithm analyzes pixels from multiple fields, comparing values of pixels at similar spatial locations but different times, and makes interpolations using averages of known values. Thus, logical operations are evaluated of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants. See, e.g., MediaTek U.S. Patent No. 6,456,329, Col. 4:45-64 (**Exhibit 15**): FIG. 4 is a diagram illustrating the relative spatial positions of a sequence of pixel-containing lines of a portion of one image field and a transformation thereof to remove the about one-half line spatial offset or misalignment that produces the aforementioned vertical jitter. A suitable transformation (or filtering) is one that interpolates, such as by simple averaging, the pixels of two adjacent lines of one of the two NTSC interlaced fields and substitutes the averaged line therefor. Where the transformation operates on the lines of field B, for example, as in FIG. 4, an interpolation by averaging is performed by adding the values of adjacent lines a and b of field B and dividing the sum by two, the result being the averaged line a' of transformed or filtered field B'. Similarly, lines b and c of field B are likewise averaged to produce the averaged line b' of transformed field B'. Preferably, the values of pixels at corresponding horizontal positions along each of the lines are transformed to produce a pixel value for the pixel at that particular position in the transformed line. Also preferably, the transformation Therefore, the best combination of these most likely correct linear combinations to be used to generate the values of the missing pixels are evaluated by logical operations.
said logical operations selected from the group consisting of greater	The logical operations are selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor' which are all Boolean logic

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than, greater than or equal to, less than, less than or equal to, `and`, `or`, and `xor`; and	operations commonly utilized in digital logic circuitry used to implement the MDDi portion of the MediaTek circuits.
(c) deciding upon assignment of values to missing spatial pixels according to results of said logical operations.	Based on the logical operations, the MDDi circuit makes the assignment of the values to the missing spatial pixels according to the results thus completing the deinterlacing operation.
Claim 8	
The method of claim 7, wherein said sequence of fields of pixels to be de-interlaced features a current spatial field featuring missing spatial pixels and said spatial pixels with known values located in said sequence of aid fields, and at least one temporal field featuring said temporal pixels with said known values located in said sequence of said fields.	Because the interlaced video signals which the Vizio televisions with MDDi deinterlacing all meet video standards (e.g. NTSC, 1080i HDTV) the sequence of fields of pixels to be de-interlaced features a current spatial field featuring missing spatial pixels (i.e. the missing pixels of the missing scan lines of video) and spatial pixels with known values (i.e. the included pixels of the included scan lines of video which pixels have known values) and at least one temporal field (e.g. the immediately previous or immediately past field) with temporal pixels with known values (i.e. the included pixels of the included scan lines of video which pixels have known values).
Claim 9	
9. The method of claim 8, wherein said at least one temporal field featuring said temporal pixels with said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field	In order for the MDDi circuit to perform 3:2 pulldown deinterlacing it is necessary to utilize both the immediate previous and immediate next temporal field in order that the 3 field exposure of one film frame may be distinguished from 2 field and 1 field exposures thereby ensuring that at least one of the group of immediate previous and immediate next temporal field is utilized as said one temporal field.

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to said current spatial field located in said sequence of said fields.	
Claim 14	
14. A method for de-interlacing an interlaced video format, the method comprising the steps of:	All Vizio flat panel (e.g. HDTV) televisions must deinterlace received interlaced video signal (e.g. NTSC, 1080i HDTV) in order to display those signals in progressive form on the flat panel. See **Exhibit 8**, p. 26: 3.De-interlacing 2nd generation advanced Motion adaptive de-interlacing Automatic detect film or video source 3:2/2:2 pull down source detection Main/PIP 2 independent de-interlacing processor See **Exhibit 8**, p. 50: whole new viewing experience.Credible Audio/Video Quality : The MT5351 use advanced motion-adaptive de-interlace algorithm to achieve the best movie/video playback , The embedded See **Exhibit 9**, p. 26: **World-Leading Audio/Video Technology:** The MT538x family has built-in high resolution and high-quality audio codec. It includes MediaTek MDDi™ de-interlace solution to generate very smooth picture quality for motions. A 3D comb filter added to the TV decoder recovers great detail for still pictures. The special color processing technology provides natural, deep colors and true studio quality graphics.

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	See **Exhibit 9**, p. 29: 10. Automatic detect films or video sources 11. 3:2/2:2 pull down source detection 12. The MT5380 support bob mode de-interlace. The MT5381 support 1366 width motion-adaptive de-interlace. The MT5382 supports maximum 1920 width motion-adaptive de-interlace. The entire MT538x family supports excellent low angle image processing. See **Exhibit 10**, p. 38: **MT8205 Application** MT8205 is a highly integrated single chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV Decoder to retrieve the best image from popular composite signals. On-chip advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor. See **Exhibit 10**, p. 43: **b. De-interlacing** Automatic detect film or video source 3:2/2:2 pull down source detection Advanced Motion adaptive de-interlacing

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	See **Exhibit 11**, p. 34: **MT8205 Application** MT8205 is a highly integrated single chip for PDP TV supporting video input and output format up to HDTV. It includes 3D comb filter TV Decoder to retrieve the best image from popular composite signals. On-chip advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor. Optional 2nd HDTV or SDTV inputs allows user to see multi-programs on same screen. Flexible scalar provides wide adoption to various PDP panel for different video sources. Its on-chip audio processor decodes analog signals from Tuner with lip sync control, delivering high quality post-processed sound effect to customers. On-chip microprocessor reduces the system BOM and shortens the schedule of UI design by high level C program. MT8205 is a cost-effective and high performance HDTV-ready solution to TV manufactures.
receiving the interlaced video format featuring a sequence of fields of pixels to be de-interlaced;	The interlaced video signal is received by the TV via an antenna connector and tuner and/or video connector. Interlaced video signals by definition incorporate a sequence of fields of pixels with the commonly used interlaced video signals (e.g. NTSC, 1080i) having two fields with one field containing all of the even scan lines and the other field containing all of the odd scanning lines. The fields by definition have missing scanning lines and thus missing pixels of those scanning lines. See **Exhibit 8**, p. 21:

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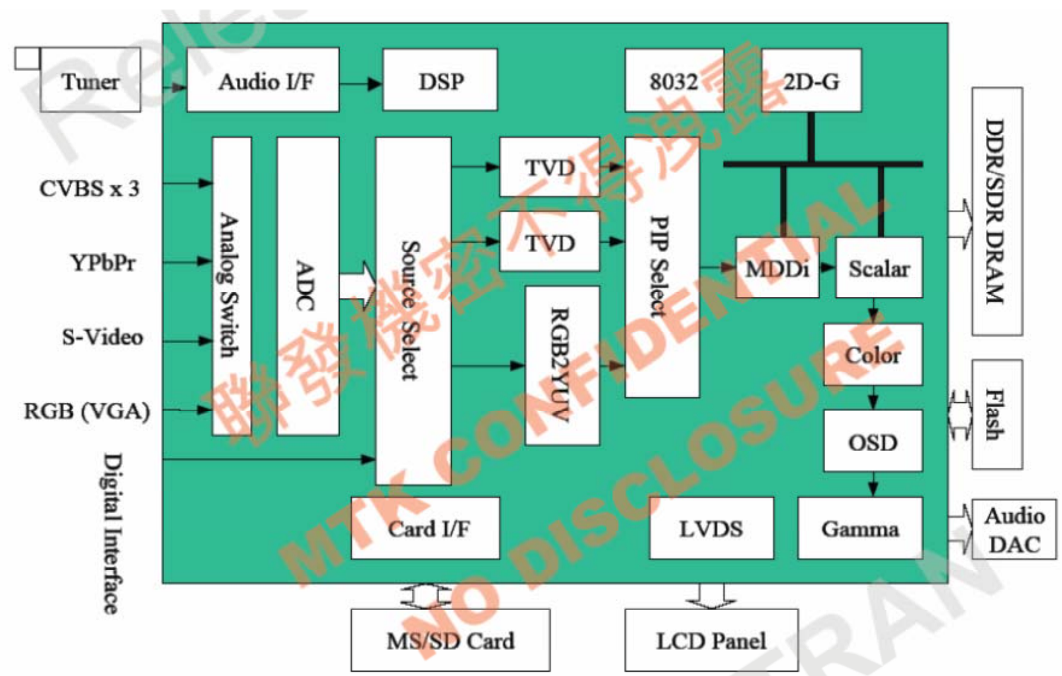
	BOLOCK DIAGRAM  See **Exhibit 9**, p. 27:

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	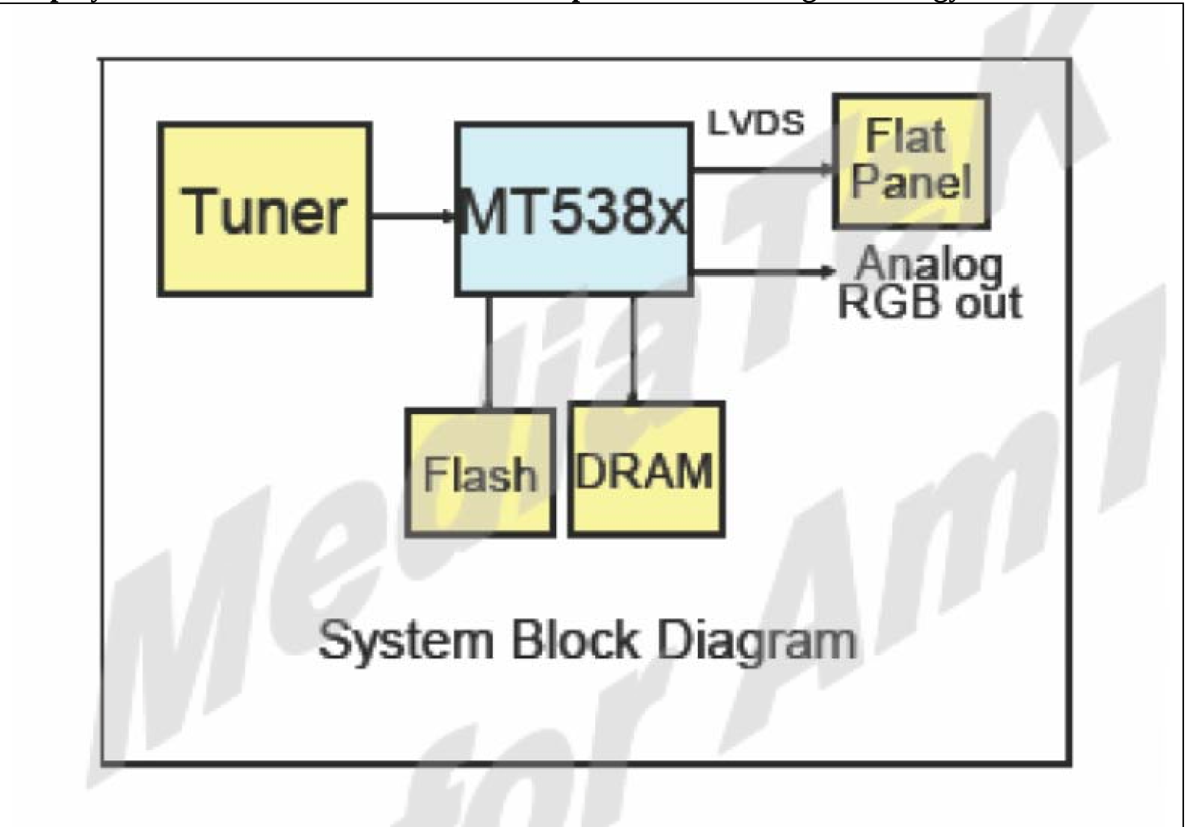 See **Exhibit 10**, p. 31:

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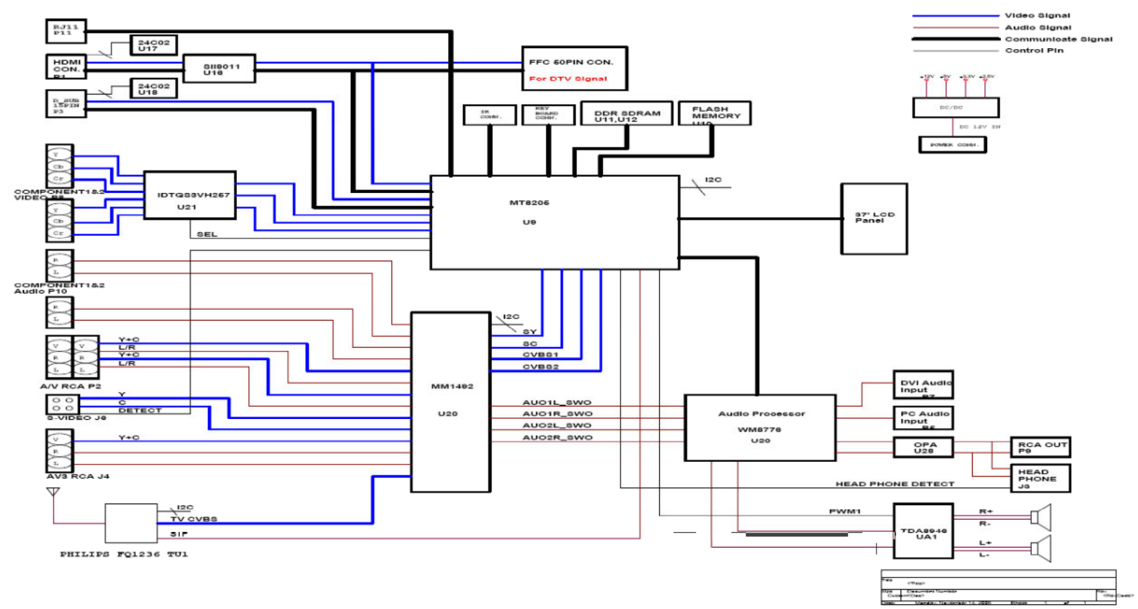
	Main Board Block Diagram  See **Exhibit 11**, p: 27

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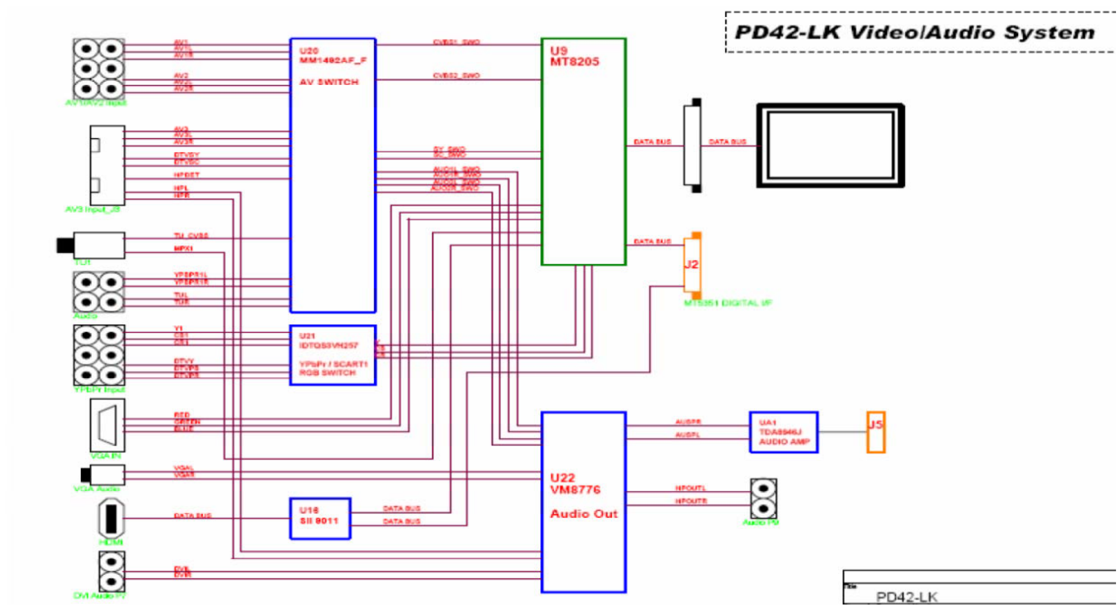
	Main Board Block Diagram 
using a current spatial field featuring missing spatial pixels and said spatial pixels with known values, located in said sequence of said pixels,…	For interlaced video signals (e.g. NTSC, 1080i) by definition the current spatial field has missing scan lines and thus missing pixels of those scan lines with the purpose of deinterlacing being to recreate (at least) those scan lines. The missing spatial pixels are (because they are missing) of unknown value in that field and the included spatial pixels of the included scan lines have known values. The MDDi algorithm is a motion adaptive de-interlacer. (e.g. **Exhibit 8**, p. 26; **Exhibit 9**, p. 29; **Exhibit 10**, p. 38 and 43; **Exhibit 11**, p. 34). See also, e.g., MediaTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (**Exhibit 16**):

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	However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation.
and one temporal field featuring temporal pixels with known values, located in said sequence of said fields,…	Temporal fields include the immediately previous and immediately next fields as set for the in the standards of the received video signal (e.g. NTSC, 1080i) and like the current spatial field above have pixels with known values. The MDDi algorithm is a motion adaptive de-interlacer. (e.g. **Exhibit 8**, p. 26; **Exhibit 9**, p. 29; **Exhibit 10**, p. 38 and 43; **Exhibit 11**, p. 34). See also, e.g., MediaTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (**Exhibit 16**): However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation.
…for determining values of said missing pixels of said current spatial field;	The current spatial field and temporal field are used to determine the values of the missing pixels of the current spatial field, i.e. MDDi operates to perform deinterlacing of the current spatial field thus creating a progressive field (or frame). The MDDi algorithm is a motion adaptive de-interlacer. (e.g. **Exhibit 8**, p. 26; **Exhibit 9**, p. 29; **Exhibit 10**, p. 38 and 43; **Exhibit 11**, p. 34). See also, e.g., MediaTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (**Exhibit 16**):

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	However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation.
evaluating logical operations of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of said temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants,	The MDDi algorithm is a motion adaptive de-interlacer. (e.g. **Exhibit 8**, p. 26; **Exhibit 9**, p. 29; **Exhibit 10**, p. 38 and 43; **Exhibit 11**, p. 34). See also, e.g., MediaTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (**Exhibit 16**): However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation. The MDDi algorithm analyzes pixels from multiple fields, comparing values of pixels at similar spatial locations but different times, and makes interpolations using averages of known values. Thus, logical operations are evaluated of linear combinations of values selected from the group consisting of averages of said known values of said spatial pixels, averages of said known values of temporal pixels, standard deviations of said known values of said spatial pixels, standard deviations of said known values of said temporal pixels, minimums of said standard deviations of said known values of said spatial pixels, absolute values of differences between said averages of said known values of said temporal pixels and said known values of said spatial pixels, said known values of said spatial pixels, and a plurality of constants. See, e.g., MediaTek U.S. Patent No. 6,456,329, Col. 4:45-64 (**Exhibit 15**):

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	FIG. 4 is a diagram illustrating the relative spatial positions of a sequence of pixel-containing lines of a portion of one image field and a transformation thereof to remove the about one-half line spatial offset or misalignment that produces the aforementioned vertical jitter. A suitable transformation (or filtering) is one that interpolates, such as by simple averaging, the pixels of two adjacent lines of one of the two NTSC interlaced fields and substitutes the averaged line therefor. Where the transformation operates on the lines of field B, for example, as in FIG. 4, an interpolation by averaging is performed by adding the values of adjacent lines a and b of field B and dividing the sum by two, the result being the averaged line a' of transformed or filtered field B'. Similarly, lines b and c of field B are likewise averaged to produce the averaged line b' of transformed field B'. Preferably, the values of pixels at corresponding horizontal positions along each of the lines are transformed to produce a pixel value for the pixel at that particular position in the transformed line. Also preferably, the transformation Therefore, the best combination of these most likely correct linear combinations to be used to generate the values of the missing pixels are evaluated by logical operations.
said logical operations selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, \`and\`, \`or\`, and \`xor\`; and	The logical operations are selected from the group consisting of greater than, greater than or equal to, less than, less than or equal to, 'and', 'or', and 'xor' which are all Boolean logic operations commonly utilized in digital logic circuitry used to implement the MDDi portion of the MediaTek IC.
deciding upon assignment of said values to said missing spatial pixels according to results of said logical operations.	Based on the logical operations the MDDi circuit makes the assignment of the values to the missing spatial pixels according to the results thus completing the deinterlacing operation.
Claim 15	
15. The method of claim 14, wherein said one temporal field featuring said temporal pixels with	In order for the MDDi circuit to perform 3:2 pulldown deinterlacing it is necessary to utilize both the immediate previous and immediate next temporal field in order that the 3 field exposure of one film frame may be distinguished from 2 field and 1 field exposures thereby

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said known values is selected from the group consisting of immediate previous said temporal field to said current spatial field located in said sequence of said fields, and immediate next said temporal field to said current spatial field located in said sequence of said fields.	ensuring that at least one of the group of immediate previous and immediate next temporal field is utilized as said one temporal field.

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Vizio (or its customers or retailers) have infringed claims 56, 57, 58, 59, and 62 of U.S. Patent No. 7,271,840 ("the '840 patent") within the meaning of 35 U.S.C. 271(a) by making, using, selling, offering for sale, or importing in to the United States televisions incorporating MediaTek MDDIi Motion Adaptive Deinterlacing with 3:2 Pulldown Detection, including at least Vizio's L42HDTV10A, GV42L, VW46L, FHDTV10A, L37HDTV, and P42HDTV10A (e.g. MediaTek MT535X, MT538X and MT820X video signal processing chips with MDDi). As described, Vizio also induces and contributes to infringement within the meaning of 35 U.S.C. 271(b) and 35 U.S.C. 271(c). On information and belief, many more Vizio televisions incorporate MediaTek MDDi Motion Adaptive Deinterlacing technology. This claim chart is meant to be exemplary of infringement by any Vizio television incorporating MDDi Motion Adaptive Deinterlacing with 3:2 Pulldown Detection. As discovery has just begun, Oplus reserves the right to add additional claims and/or products.

Refer to service manuals for the representative Vizio TVs, e.g. VW46L FDDTV10A service manual PDF pages 25-29, (**Exhibit 9**); L42HDTV10A/GV42L service manual PDF pages 20-26, 50, (**Exhibit 8**); L37HDTV service manual PDF pages 30-32, 37-43, (**Exhibit 10**); P42HDTV10A service manual PDF pages 25-28, 33-34, (**Exhibit 11**).

Claim	Infringement by Vizio Televisions or Displays Incorporating MDDi Motion Adaptive Deinterlacing Technology
Claim 56	
56. A method determining entropy of a pixel of a real time streaming digital video image signal,	Vizio TVs which utilize MediaTek MDDi Motion Adaptive Deinterlacing with 3:2 Pulldown Detection (hereinafter "MDDi") operate so as to determine the entropy of a pixel of a real time streaming digital video image signal (e.g. a recorded or broadcast digital television signal). Specifically, MDDi utilizes 3:2 deinterlacing. In 3:2 deinterlacing, in order to determine if a given pixel belongs to one field or another, i.e. to determine which field or frame it is related to, it is necessary to determine its entropy. This must be done in real time in order for the Vizio TV to display real time video programs. See **Exhibit 8**, pp. 21, 26, 50, 52; **Exhibit 9**, pp. 26, 29, **Exhibit 10**, pp. 38, 43, 59, 61; **Exhibit 11**, pp. 34, 39, 55, 57
for automatically correcting an error produced during real time editing of the real time streaming digital video	Vizio TVs which utilize MDDi perform deinterlacing to covert interlaced video into progressive video. Interlaced video signals are subject to errors caused by real time editing of the video signal. The 3:2 deinterlacing performed by MDDi detect and correct such errors.

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image input signal,	See Ex. 8, pp. 21, 26, 50, 52; Ex. 9 , pp. 26, 29, Ex. 10, pp. 38, 43, 59, 61; Ex. 11, pp. 34, 39, 55, 57
comprising the steps of: receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;	The streaming digital video image input signal (i.e. the digital TV input signal) is received by the Vizio televisions during a predetermined time interval. Specifically, the 3:2 deinterlacing performed by MDDi uses a predetermined time interval comprising 3 consecutive fields. However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation. MediatTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (Ex. 16) See also **Exhibit 8**, pp. 21, 26, 50, 52; **Exhibit 9**, pp. 26, 29, **Exhibit 10**, pp. 38, 43, 59, 61; **Exhibit 11**, pp. 34, 39, 55, 57
assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous	The streaming digital video image input signal received by the Vizio televisions contains pixels. MDDi 3:2 deinterlacing requires 3 fields commonly referred to in the art as the current, previous, and next fields. MDDI operates to assign and characterize a local neighborhood of neighboring pixels for each image pixel of an image in a temporal interlace sequence of the three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal.

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field, a next field, and a current field; and	However, using the motion-adaptive de-interlacing method is the most efficient way to process interlaced to progressive conversion. The motion-adaptive de-interlacing method generally includes two steps. The first step involves processing motion detection, which means detecting a motion situation by checking a fix number of video fields of the interlaced video signal. Then, the second step involves selecting a proper interpolation algorithm according to the detected motion situation. E.g., MediatTek U.S. Patent No. 7,286,186 at Col. 1:48-56 (**Exhibit 16**) See also **Exhibit 8**, pp. 21, 26, 50, 52; **Exhibit 9**, pp. 26, 29, **Exhibit 10**, pp. 38, 43, 59, 61; **Exhibit 11**, pp. 34, 39, 55, 57.
determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels, said determining comprising the steps of:	In order to perform 3:2 deinterlacing, MDDI must determine the entropy of each virtual pixel and the previous and next pixel from the previous and next fields in order to know or estimate which of those pixels are obtained from or belong to the same input image frame. See **Exhibit 8**, pp. 21, 26, 50, 52; **Exhibit 9**, pp. 26, 29, **Exhibit 10**, pp. 38, 43, 59, 61; **Exhibit 11**, pp. 34, 39, 55, 57. This necessarily requires the following steps, as set forth below.
calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local	The values of parameters for the previous and next field neighborhoods are calculated for each pixel in the previous and next field. The parameters represent the distance weighted sum relative to the virtual pixel for each previous and next field neighborhood. In order to perform 3:2 deinterlacing MDDi must determine the neighborhood parameters of each previous and next pixel neighborhoods from the previous and next fields in order to know or estimate which of the pixels are obtained from or belong to the same input image frame in the presence of field to field motion which results from temporally adjacent fields being derived from different image frames.

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neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;	
calculating a value of a virtual-pixel intra-local neighborhood parameter, for each said virtual pixel in said current field;	The parameter value of the virtual pixel local neighborhood (i.e. the neighborhood in the same or current field as the virtual pixel) is calculated for each virtual pixel. In order to perform 3:2 deinterlacing MDDi must determine the neighborhood parameters of the virtual pixel neighborhood in order to know or estimate which of the previous or next pixels are obtained from or belong to the same film image frame as the virtual pixel.
adjusting a value of a pixel entropy counter for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and	The pixel entropy counter value for each previous and next field pixel is adjusted, as well as for each current field virtual pixel. In order for MDDi to determine or estimate which adjacent field pixel is most closely related to the virtual pixel an entropy counter is utilized to avoid false triggering due to noise, which false triggering would create undesirable image artifacts in the presence of random noise. The value of pixel entropy of the counter is adjusted for each of the previous, next and virtual pixel.
calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said pixel entropy counters of said pixels, whereby said values of the entropy of each said previous pixel in said	An entropy value is calculated for each previous and next field pixel and for each current field virtual pixel. The values are used to automatically decide, using mathematical logical operations (e.g. digital logic) not to use value of the previous pixel or next pixel to assign a real value to the virtual pixel. By not using one of the previous pixel or next pixel value an error produced during editing of the interlaced video signal is corrected. The values of the pixel entropy counters are utilized by MDDi to calculate a value of entropy for each pixel in the previous, next and present field in order that those values are reasonably accurate and immune to random noise but nevertheless represent the entropy of the respective pixel thereby reducing or preventing improper values of the previous and next pixels from being assigned to the value

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previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting an error produced during real time editing of the streaming digital video image input signal.	of the virtual pixel thereby allowing the virtual pixel value to accurately match the image frame represented by the present field in the presence of 3:2 pulldown errors resulting from incorrect editing. The resulting MDDi deinterlaced signal will exhibit correct deinterlacing frame association of virtual pixels as seen on the displayed image.
Claim 57	
57. The method of claim 56, whereby in step (a) the streaming digital video image input signal is received following subjecting the streaming digital video image input signal to a pull down mode conversion method selected from the group consisting of a 3:2 pull down mode conversion method, a 2:2 pull down mode conversion method, and	Vizio Televisions with MDDi utilize a 3:2 and 2:2 pull down mode conversion method. G . Video Processing : 1. Advanced Motion adaptive de-interlace on SDTV resolution. 2. Support clip 3. 3:2/2:2 pull down source detection. 4. Arbitrary ratio vertical/horizontal scaling of video , from 1/15X to 16X. 5. Support Edge preserve. 6. Support horizontal edge enhancement. 7. Support Quad-Picture.

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a scan rate conversion, other than the 3:2 pull down mode conversion and the 2:2 pull down mode conversion, from a non-interlaced film format or a progressive video format to an interlaced video format.	**Exhibit 11**, p. 57. See also **Exhibit 8**, pp. 21, 26, 50, 52; **Exhibit 9** , pp. 26, 29, **Exhibit 10**, pp. 38, 43, 59, 61; **Exhibit 11**, pp. 34, 39, 55.
Claim 58	
58. The method of claim 56, whereby step (b) further comprises: (i) assigning a first local neighborhood of said neighboring pixels to each said virtual pixel within a missing horizontal line of said current field.	Vizio TVs utilize NTSC video signals. **Chapter 1 Features** • 1024 x 768 pixel resolution with 16:9 wide screen • ATSC (Off-air)/QAM (Cable)/NTSC (Antenna/Cable) See, e.g, **Exhibit 11**, p. 4. See also **Exhibit 10**, p. 6; **Exhibit** 9, p. 20; **Exhibit 8**, p. 18. When the streaming digital video image input signal is an interlaced NTSC video signal step (b) further comprises MDDi assigning a first local neighborhood of said neighboring pixels to each virtual pixel within a missing horizontal line (i.e. the even or odd lines) of the current field (which contains the odd or even lines respectively). This association arises because of the standard interlacing format of NTSC video.
Claim 59	
59. The method of claim 58, whereby step (b) further comprises: (ii) assigning a second local neighborhood of said neighboring pixels to each said pixel located in said previous field, and to each said pixel located in said next field.	Vizio TVs utilize NTSC video signals. **Chapter 1 Features** • 1024 x 768 pixel resolution with 16:9 wide screen • ATSC (Off-air)/QAM (Cable)/NTSC (Antenna/Cable)

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	See, e.g, **Exhibit 11**, p. 4. See also **Exhibit 10**, p. 6; **Exhibit 9**, p. 20; **Exhibit 8**, p. 18. When the streaming digital video image input signal is an interlaced NTSC video signal step (b) further comprises MDDi assigning a second local neighborhood of said neighboring pixels to each pixel located in the previous field and each pixel located in the next field. This association arises because of the standard interlacing format of NTSC video.
Claim 62	
62. The method of claim 59, whereby step (b) further comprises: (iii) selecting a said previous pixel and a said next pixel as two sequential pixels in said previous field and in said next field, respectively.	**Chapter 1 Features** • 1024 x 768 pixel resolution with 16:9 wide screen • ATSC (Off-air)/QAM (Cable)/NTSC (Antenna/Cable) See, e.g, **Exhibit 11**, p. 4. See also **Exhibit 10**, p. 6; **Exhibit 9**, p. 20; **Exhibit 8**, p. 18. When the streaming digital video image input signal is an interlaced NTSC video signal the previous pixel and the next pixel (of the spatial location corresponding to the virtual pixel) in the previous and next fields respectively are selected by MDDi as two sequential pixels. This association arises because of the standard interlacing format of NTSC video.